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# Liebert DS

| | |
|---|---|
| Job Name | T-MOBILE - DENVER, CO - AIR |
| Model | DS105AUA1EI / MCL220E8AEA997 |
| Quantity | 2 (Two) / 2 (Two) |
| Date | December 5, 2014 |
| Invoice # | |
| Purchaser | SWSG |
| P.O. # | 14-068-H01-LIE-P1 |
| Tag # | |
| Submitted By | Liebert Capitol Office – Jim Grant |

# LIEBERT DS
# ENGINEERING SPECIFICATION SHEET
# AIR-COOLED SYSTEMS

**Project Name:** T-MOBILE - DENVER, CO
**Date:** December 5, 2014
**Reference No.:** Q02192366
**Submitted By:** Liebert Capitol Office – Jim Grant

**Model Number: DS105AUA1EI** **Quantity: 2**
**Condenser Model Number: MCL220E8AEA997** **Quantity: 2**

**ELECTRICAL SUPPLY REQUIREMENTS**

**Liebert Room Unit: 460 Volt, 3 Phase, 60 Hertz, 83.7 Full Load Amps, 97.4 Wire Sizing Amps, 110.0 Over-Current Protection Device, 65,000 Amps RMS Short Circuit Current Rating**
**Air-Cooled Condenser Unit: 460 Volt, 3 Phase, 60 Hertz, 11.2 Full Load Amps, 11.9 Wire Sizing Amps, 15.0 Over-Current Protection Device**

**CABINET SECTION**
- Downflow Unit
- Colors: Main: Z-0420 (IBM Charcoal)

**NET CAPACITY DATA**
- 75ºF (23.9) – 60.1ºF (15.6ºC)
- 45% RH
- Total Capacity: 313,300 BTU/hr (91.8 kW)
- Sensible Capacity: 243,700 BTU/hr (71.4 kW)

**EVAPORATOR FAN SECTION**
- Electronically Commutated (EC) Plug Fan Operates Under Floor
- Fan Motor Horsepower: 3.6 (2.7 kW) per Motor, 3 (Three) Motor per Unit
- Air Volume: 13,700 CFM (23,276 CMH)
- External Static Pressure: 0.2 Inches of Water (75 Pa)
- Elevation: 5,280 Feet (1,609 meters)
- Module Dry Weights: 2,774 lbs (1,258 kg)

**FILTER SECTION**
(** Efficiency based on ASHRAE Standard 52.2)
- 4 inch Merv 8 Filters

**HUMIDIFIER SECTION**
- Infrared Humidifier
  Capacity: 22 lbs/hr (10 kg/hr)

**REHEAT SECTION**
# Includes Fan Motor
- 3-stage Electric Reheat
  Capacity: 102,400 BTU/hr (30 kW)

**CONTROL SECTION**
- Microprocessor with Large Graphic Display
- Display Language English
- Low Voltage Terminal Package
- Local Alarms
  Terminals located on wire raceway. All alarms require N.O. contacts. 24 Volt A.C.
  - Main Fan Overload
  - Compressor Overload Alarm Terminal 24*
  - Local Alarms (4 max)
    1 _____ Terminal 50*
    2 _____ Terminal 51*
    3 _____ Terminal 55*
    4 _____ Terminal 56*

**ADDITIONAL EQUIPMENT**
- Dual Float Condensate Pump
- Digital Scroll Compressors
- R-407C Refrigerant (charges and supplied by others)
- Locking Disconnect Switch
- Reheat and Humidifier Lockout

- Smoke Sensor
- 36" Floor Stand
- IS-UNITY-DP Intellislot Unity Card; Qty; 1 (One) Per Unit
- LT410, Point Leak Sensors; Qty; 2 (Two) Per Unit
- Damper motor control circuit. Qty: 1 (One) Per Unit
- 1 (One) Year Limited Labor Warranty
- 2nd Years Parts Extended Warranty
- 2nd Year Compressor Extended Warranty

**AIR-COOLED CONDENSER SECTION**

**STANDARD FEATURES**
- Microchannel aluminum coil(s)
- Integrated fan motor/blade/guard assembly
- Electronic control of fan speed
- Factory wired and mounted NEMA 3R electrical panel/box
- Fused, locking and lockable electrical disconnect switch
- Variable fan speed motors

**CABINET**
- Bright aluminum exterior panels
- Bright aluminum NEMA 3R electrical panel
- Bright aluminum legs

**CONTROL/COMMUNICATION/FAN**
- Variable speed EC fans
- Premium electronic control & communication board
- CANbus connection terminals for communication with iCOM

**REFRIGERANT & CIRCUITS**
- R-407C (R-22) set points
- Dual refrigerant circuits

**OPTIONAL FEATURES**
- Liebert Lee-Temp receivers and head pressure controls for field installation
- Variable speed fans programming for Liebert Lee-Temp system

# Liebert Rating System

Project Name: **T-MOBILE - DENVER, CO**
Customer Name: **SWSG**
Sales Rep. Name: **JUVELITO CACA**
Office Name: **Liebert North America HQ**
Phone Number:

## Liebert DS Model DS105AU; Air Cooled

| | | | |
|---|---|---|---|
| Manufacturer: | **Liebert North America** | Spec.sheet output date: | **05-Dec-14** |
| Unit Power Supply: | **460/3/60** | Width: | **132 "** |
| Refrigerant: | **R407C** | Depth: | **35 "** |
| Internal Filter Class: | **Merv 8 Std. - 4 inch (102 mm)** | Height: | **76 "** |
| Unit Airflow | **13700 cfm** | Weight: | **3040 lbs** |
| ESP: | **0.2 "WG** | Altitude: | **5280 ft** |

### Condenser

| | |
|---|---|
| Manufacturer: | **Liebert North America** |
| Model: | |
| Control Type: | **Premium** |
| Condenser Type: | **Microchannel** |
| Design Ambient: | **95 °F** |
| Quantity: | **1** |
| Airflow: | **20878 CFM** |
| Power supply: | **460/3/60** |
| Sound Level: | **Std** |
| Condenser Fan RPM: | **980** |

### Compressor

| | |
|---|---|
| Manufacturer: | **Carlyle** |
| Model: | **06DA537** |
| Compressor Type: | **SemiHermetic** |
| Power Supply: | **460/3/60** |
| Power Input: | **16.4** |
| Compressor's COP: | **2.76** |
| Quantity: | **2** |

### Cooling Coil

| | |
|---|---|
| Manufacturer: | **Liebert North America** |
| Model: | **04R12LAU** |
| Fin Type: | **Lanced** |
| Number of Rows: | **3** |
| Fins per Inch: | **12** |
| Face Area: | **32.29 sq.ft.** |
| Surface Area: | **2365.27 sq.ft.** |

### Cooling Fans

| | | | |
|---|---|---|---|
| Quantity of Fans: | **3** | Quantity of Motors: | **3** |
| Type: | **EC Plug Fan under floor** | | |
| Power Supply: | **460/3/60** | | |

## Performance - Mechanical Cooling

| Cooling Step | Enter Dry Bulb °F | Enter Wet Bulb °F | Enter Rel Humid % | Unit Air Vol CFM | Air Face Vel FPM | Amb Temp °F | Total Cool Cap kBTUh | Sens Cool Cap kBTUh | Total Heat Rej kBTUh | Evap Temp °F | Cond Temp °F | Leave Dry Bulb °F | Leave Wet Bulb °F | Total Comp Power kW | System Power Input kW | System SCOP W/W | System NSCOP W/W | Fan kW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4.0 | 75 | 60.1 | 45.0 | 13700 | 424.2 | 95 | 313.3 | 243.7 | 444.7 | 42.9 | 129.2 | 54.8 | 51.1 | 32.70 | 41.59 | 1.72 | 1.72 | 5.98 |
| Blower: WARNING: The calculated SCFM is outside the recommended limits of (12600 - 15500) cfm.. Default blower used. | | | | | | | | | | | | | | | | | | |

1) Capacity shown has been reduced by fan motor heat (net).

2) Coil airflow is reduced by a bypass of 0.73% of total unit airflow
3) Test method as defined by ASHRAE 127-2007
4) Capacity Tolerance is 5%

 v. 1.0.12.4

**Liebert iCOM® Control System**
**Intelligent Communications & Monitoring**
**Large Graphic Display**
**(Unit ~~or Wall-~~mounted)**


*Large Graphic Display shown in unit bezel*

~~Large Graphic Display for Wall-Mounting~~

The Liebert iCOM® Large Graphic Display shall be microprocessor based with a 320x240 dot matrix graphic monitor with control keys for user inputs mounted in an ergonomic, aesthetically pleasing housing. The display and housing shall be viewable while the unit panels are open or closed. All parameter changes are password protected.

~~Wall-Mounted Large Graphic Displays shall be capable of being mounted on a wall and are provided with a power supply. Wall-mounted displays can be added to a Unit-to-Unit network and remotely located from the cooling unit(s) to provide convenient monitoring and control capabilities.~~

*Large Graphic Display only features:*
The Large Graphic Display provides all of the **same features of the Small Graphic Display**, plus Large Graphic Display only features.

**Event Log** – Automatically stores the last 400 unit and system (U2U communication required) events (messages, warnings, and alarms)
**Spare Parts List** - shows a list of key spare parts, their quantity and respective parts numbers
**Unit Diary** - A free field area where unit history may be stored for reference
**View Network** – Shows a summarized view of all the cooling units connected on a U2U network
**Centralized Operation** – View and configure any cooling unit on a U2U network from a Large Graphic Display
**System View** – View the averages of all operations being performed on the U2U network
**Active Alarms on Status Screen** – Last two unit/system events are displayed at the bottom of the Status Screen for rapid identification of critical events without having to enter submenus
**Full Text Descriptions** – The large screen size eliminates the need for abbreviated text, simplifying user operation

~~**Liebert iCOM® Control System**~~
~~**Intelligent Communications & Monitoring**~~
~~**Small Graphic Display**~~
~~**(Unit-mounted only)**~~


~~Small Graphic Display shown in unit bezel~~

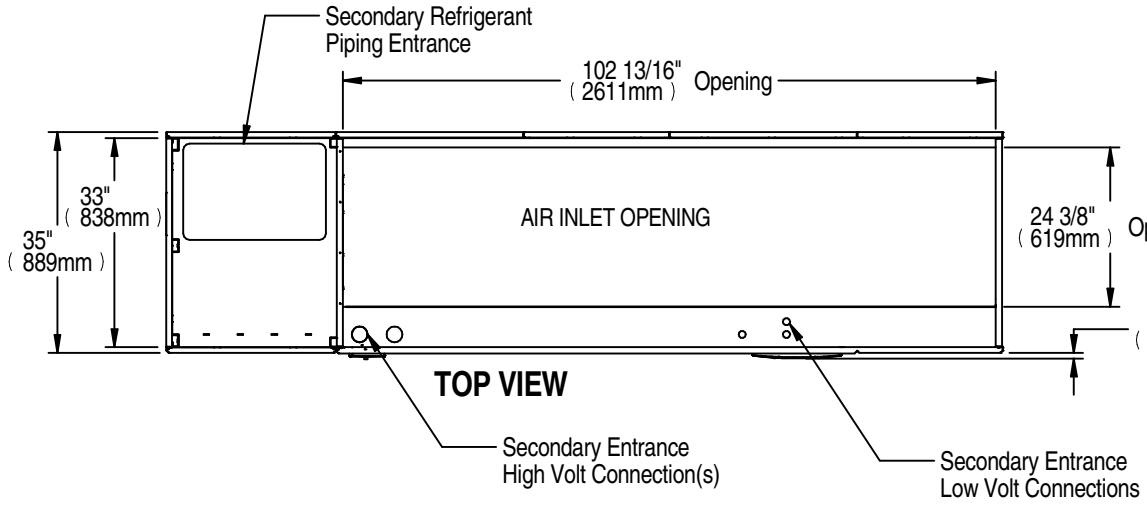
~~The Liebert iCOM® Small Graphic Display shall be microprocessor based with a 128x64 dot matrix graphic monitor with control keys for user inputs mounted in an ergonomic, aesthetically pleasing housing. The display and housing shall be viewable while the unit panels are open or closed. All parameter changes are password protected.~~

~~*Small Graphic Display Features*~~ *(additional features available with Large Graphic Display):*
**Temperature Control** – Precision temperature control is maintained while maximizing efficiency based on a user entered setpoint and tolerance.
**Humidity Control** – The dewpoint level of the room is monitored and controlled based on a user specified Relative Humidity setpoint and tolerance.
**Various Control Types** – Selectable Proportional, PI (proportional-integral), PID (proportional-integral-derivative), Intelligent control types for supply or return temperature; Relative, Compensated, or Predictive humidity control types. These control types have been developed to maximize component life and maintain precise environmental control.
**Unit Alarms** – All unit alarms are annunciated, displayed on the screen, automatically recorded in the event log, communicated to available IntelliSlot monitoring cards, and a red light flashes on the display
**Event Log** – Automatically stores the last 400 unit-only events (messages, warnings, and alarms).
**Temperature and Humidity Graphs** – Provides a graphical view of historical room conditions, selectable from 8 minutes to 16 days
**Automatic Component Sequencing** – runtimes of multiple components within a unit are automatically balanced to extend component life
**Wellness / Maintenance** – Monitors system components to warn of potential issues in advance (helps avoid unplanned downtime) and prolong component life
**Auto Restart** – After a loss of power, a cooling unit will return to is previous operating status. Cooling units can be stagger started to minimize system current draw.
**IntelliSlot Cards** – IntelliSlot cards allow for external unit communication and control
**Service Contact Information** – Local service or sales contact information can be conveniently stored
**Upgradeable** – Multiple units connected through a Unit-to-Unit network can be upgraded simultaneously or cascaded.

**Unit-to-Unit (U2U) Communication** – Communication via private Ethernet network allows for advanced control functionality (Teamwork modes, sharing sensor data, Standby Rotation, Lead-Lag, and Cascade operation). Small Graphic Displays can only configure the cooling unit they are physically connected to, while Large Graphic Displays can configure any unit on the network.
**Cascade** – Standby units on a U2U network are automatically activated if active unit(s) cannot control the environment
**Lead-Lag** – A standby unit on a U2U network is automatically activated if an alarm occurs in an active unit
**Standby Rotation** – Standby units are rotated through a U2U network to balance system run hours. Units can be set to automatically rotate daily, weekly, or monthly
**Teamwork modes**

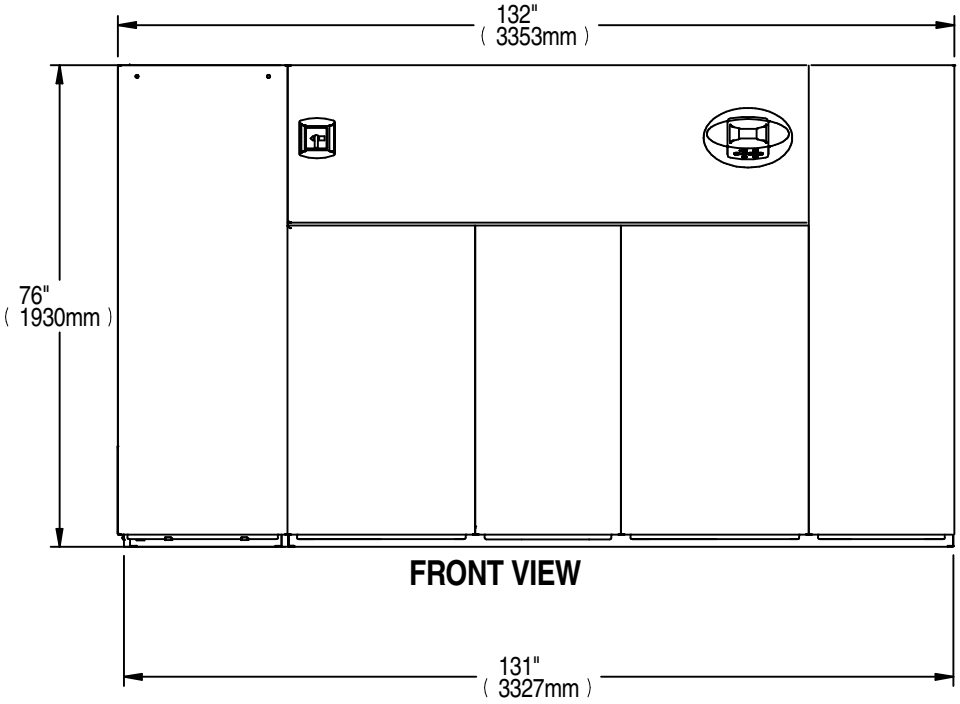
- **Mode No** – Units share data but operate independently using local sensor readings
- **Mode 1** – All units perform the same operation with the *same* intensity based on sensor readings from the entire network; typically for rooms with balanced heat loads
- **Mode 2** – All units perform the same operation with *varying* intensity based on sensor readings from the entire network; typically for rooms with un-balanced heat loads

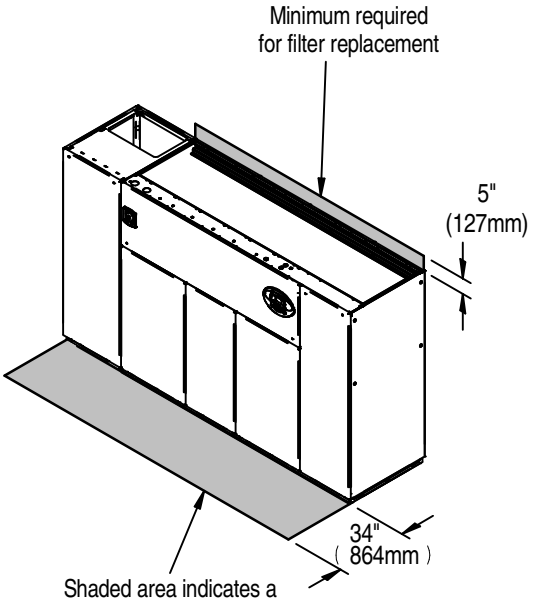
# LIEBERT DS
# CABINET AND FLOOR PLANNING DIMENSIONAL DATA
## DOWNFLOW AIR COOLED 105kW (30 TONS)
## ALL COMPRESSOR MODELS




Notes: Filters are accessible through top of unit only.

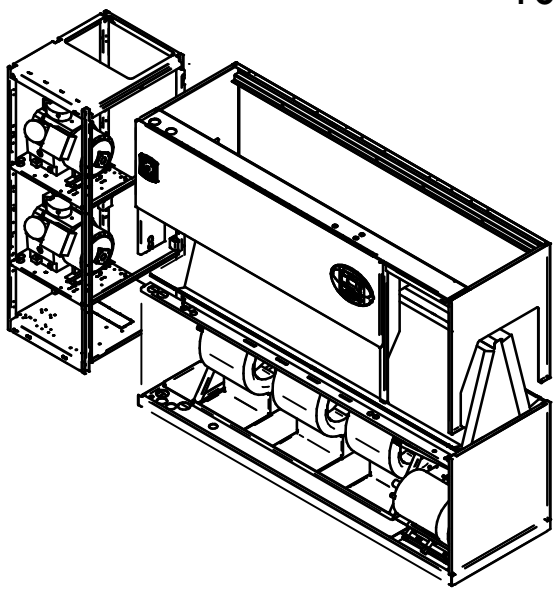
Downflow electrical connections can be made from top or bottom of unit.

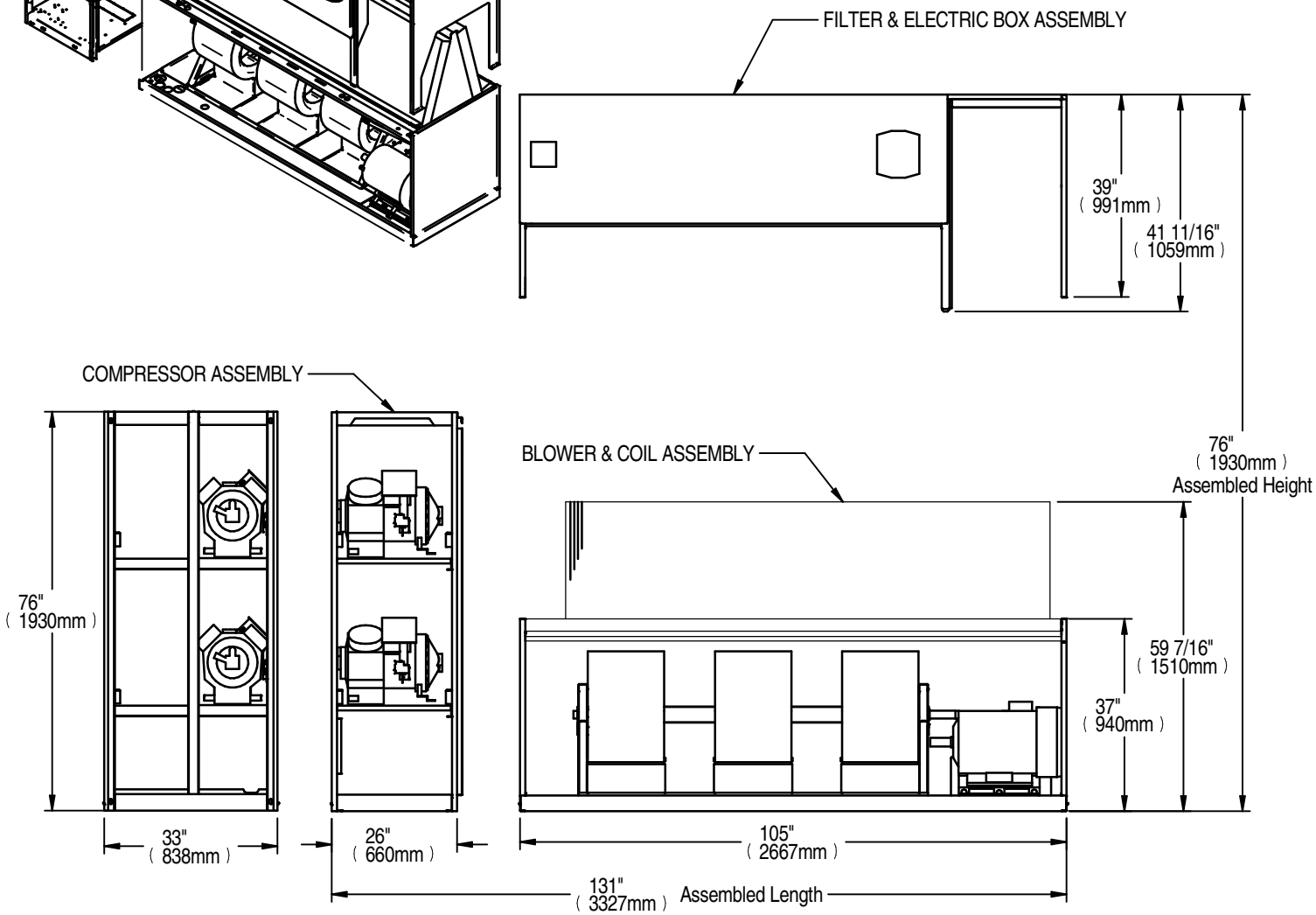



| DRY WEIGHT lb(kg) APPROXIMATE | | | |
|---|---|---|---|
| Unit with: | Model | 105 | 105 |
| | Fan type | Forward-curved Fans | EC Fans |
| Semi-Hermetic | Air Cooled | 3040 (1382) | 2774 (1258) |
| Compressors | Dual Cool | 3400 (1545) | 3134 (1422) |
| Scroll | Air Cooled | 2920 (1327) | 2654 (1204) |
| Compressors | Dual Cool | 3280 (1491) | 3014 (1367) |

# LIEBERT DS
# DISASSEMBLY DIMENSIONAL DATA
## DOWNFLOW AIR COOLED 105kW (30TONS)
## SEMI-HERMETIC COMPRESSOR MODELS
## ~~FORWARD-CURVED AND~~ EC FANS

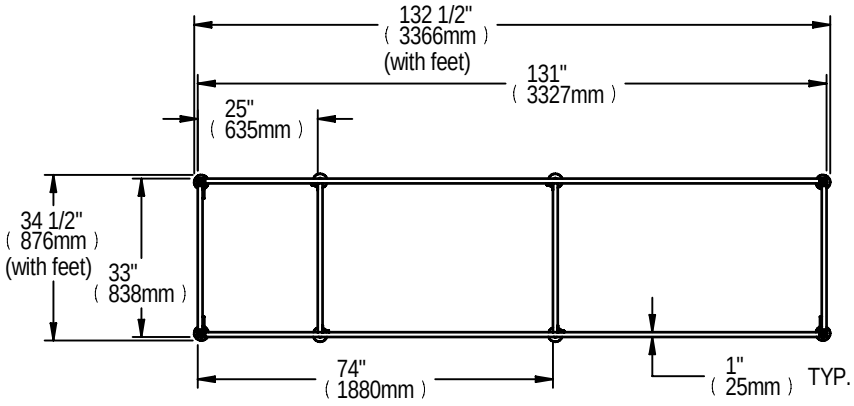


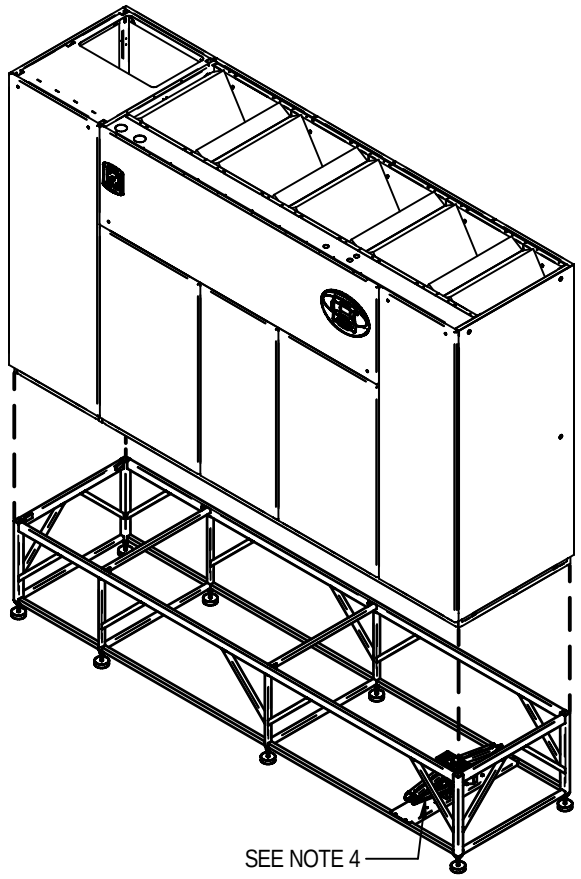


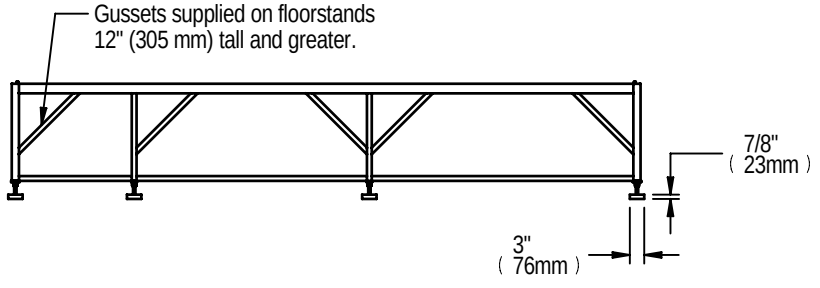

| DRY WEIGHT lb(kg) APPROXIMATE (Includes Panels) | | | | |
|---|---|---|---|---|
| | ~~Forward-curved Fans~~ | | EC Fans | |
| | Air Cooled | ~~Dual Cool~~ | Air Cooled | ~~Dual Cool~~ |
| COMPRESSOR ASSEMBLY | 950 (432) | 950 (432) | 950 (432) | 950 (432) |
| FILTER & ELECTRIC BOX ASSEMBLY | 270 (123) | 270 (123) | 270 (123) | 270 (123) |
| BLOWER & COIL ASSEMBLY | 1820 (827) | 2180 (991) | 1560 (708) | 1915 (870) |

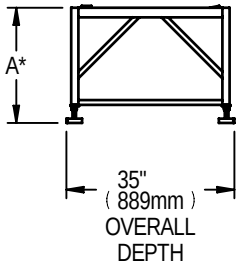
NOTE: Drawing views are simplified with panels removed to show overall dimensions.
See disassembly and handling instructions in installation manual.

# LIEBERT DS
# FLOORSTAND AND FLOOR PLANNING DIMENSIONAL DATA
## DOWNFLOW 105kW (30 TONS) MODELS WITH EC FANS




NOTE:

1) This floor stand should be used when EC fans are intended to be lowered under a raised floor. The standard Liebert DS floor stand can be used "if" the fans are to remain in their original raised position.

2) Right side of paneled unit is flush with right side of floorstand. All other paneled sides overhang floorstand 1" (25mm).

3) The floor stand used with EC units is not symmetrical and its orientation to the Liebert DS is critical for lowering the EC fans. Unless the floor stand is installed in the correct position, the blowers will not lower into the floor stand.

4) Jack and jack support are shipped loose and are intended to be placed into position under each fan and utilized to lower or raise that fan as needed.

*Leveling feet are provided with ± 1-1/2" (38mm) adjustment from nominal height "A".

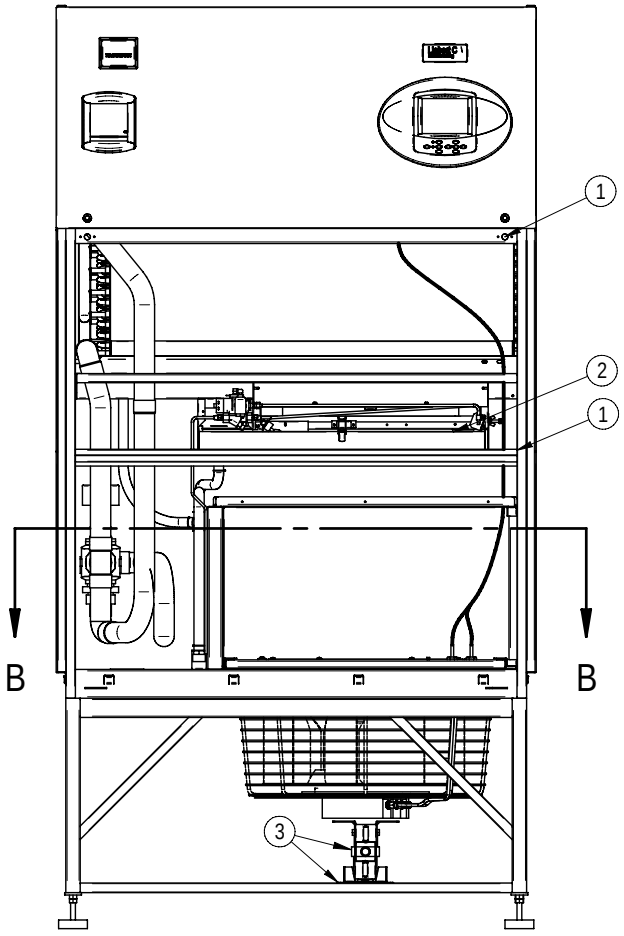
| Height in ( mm ) |
|---|
| A* |
| 24 (610) |
| 30 (762) |
| 36 (914) |
| 42 (1067) |
| 48 (1219) |

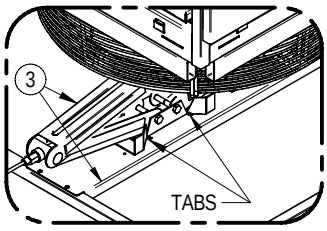
# LIEBERT
# EC FAN REMOVAL PROCEDURE
## DOWNFLOW MODELS WITH EC FANS

**WARNING** - RISK OF ELECTRIC SHOCK AND HIGH SPEED ROTATING FAN BLADES! CAN CAUSE INJURY OR DEATH! DISCONNECT ALL LOCAL AND REMOTE ELECTRIC POWER SUPPLIES AND VERIFY THAT FAN BLADES HAVE STOPPED ROTATING BEFORE WORKING WITHIN.

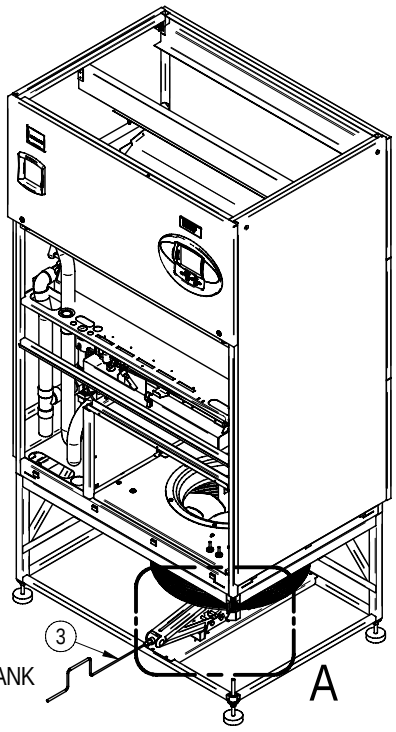
**WARNING** - RISK OF EXTREMELY HEAVY FAN MODULES DROPPING DOWNWARD SUDDENLY! CAN CAUSE INJURY OR DEATH! SUPPORT FAN MODULES BEFORE REMOVING MOUNTING HARDWARE. USE CAUTION TO KEEP BODY PARTS OUT OF FAN MODULE PATHWAY OF MOVEMENT DURING REMOVAL. ONLY QUALIFIED PERSONNEL SHOULD WORK ON THIS EQUIPMENT. FAN MODULES WEIGH IN EXCESS OF 100 LBS. (45.4 KG) EACH.

LIEBERT CW041 UNIT SHOWN WITH LIEBERT 24" FLOORSTAND. CUSTOMER UNIT MAY APPEAR SLIGHTLY DIFFERENT. READ USER MANUAL SL-18057 AND INSTRUCTION SHEET 195788 BEFORE RE-POSITIONING THE FAN MODULES.

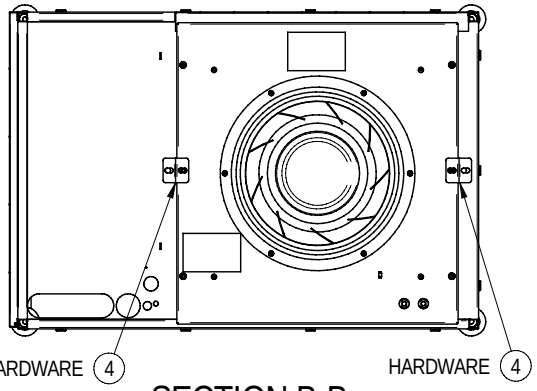



DETAIL A
JACK LOCATION




FLOORSTAND PARTIALLY HIDDEN




SECTION B-B

TOOLS NEEDED:
-1/2" HEX SOCKET & WRENCH
-FACTORY SUPPLIED JACK, CRANK AND JACK SUPPORT
-CABLE TIE CUTTER
-FIELD SUPPLIED FAN REMOVAL DEVICE CAPABLE OF SUPPORTING 100 LBS. (45.4 KG).

1. REMOVE PANELS FROM FRONT OF UNIT.

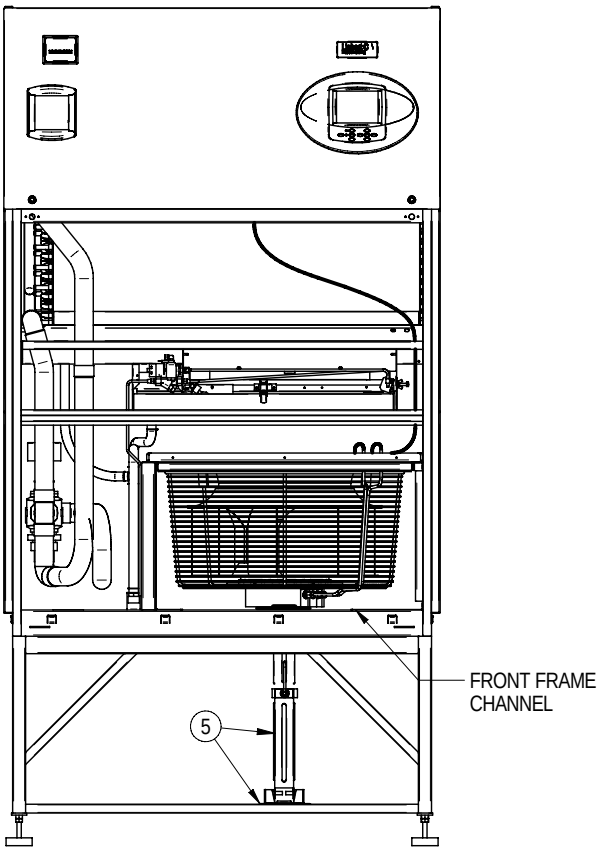
2. FOR EASE OF FAN REMOVAL, REMOVAL OF HUMIDIFIER PAN IS RECOMMENDED.

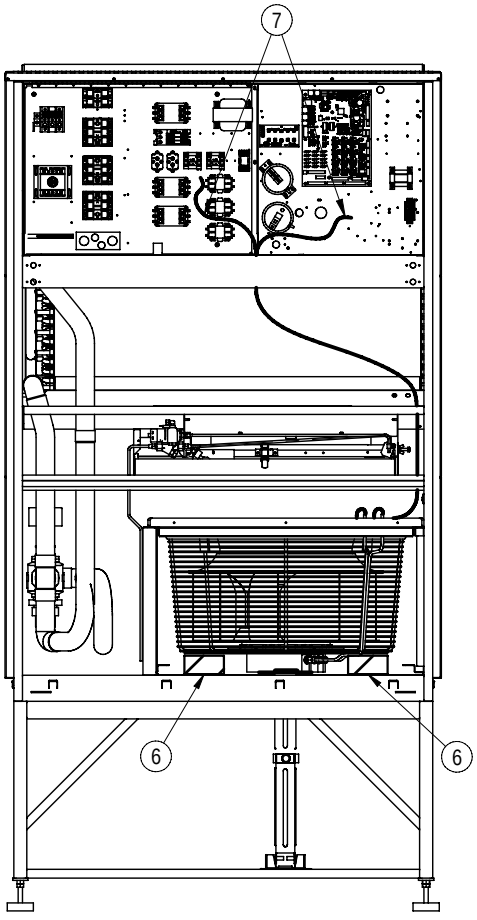
3. IF FAN MODULE IS LOWERED INTO THE FLOORSTAND, POSITION THE FACTORY SUPPLIED JACK AND JACK SUPPORT UNDER THE FAN MODULE SO IT IS SAFELY SUPPORTED BEFORE REMOVING ANY HARDWARE. IF FAN MODULE IS IN THE "UP" POSITION, PROCEED TO STEP 6.

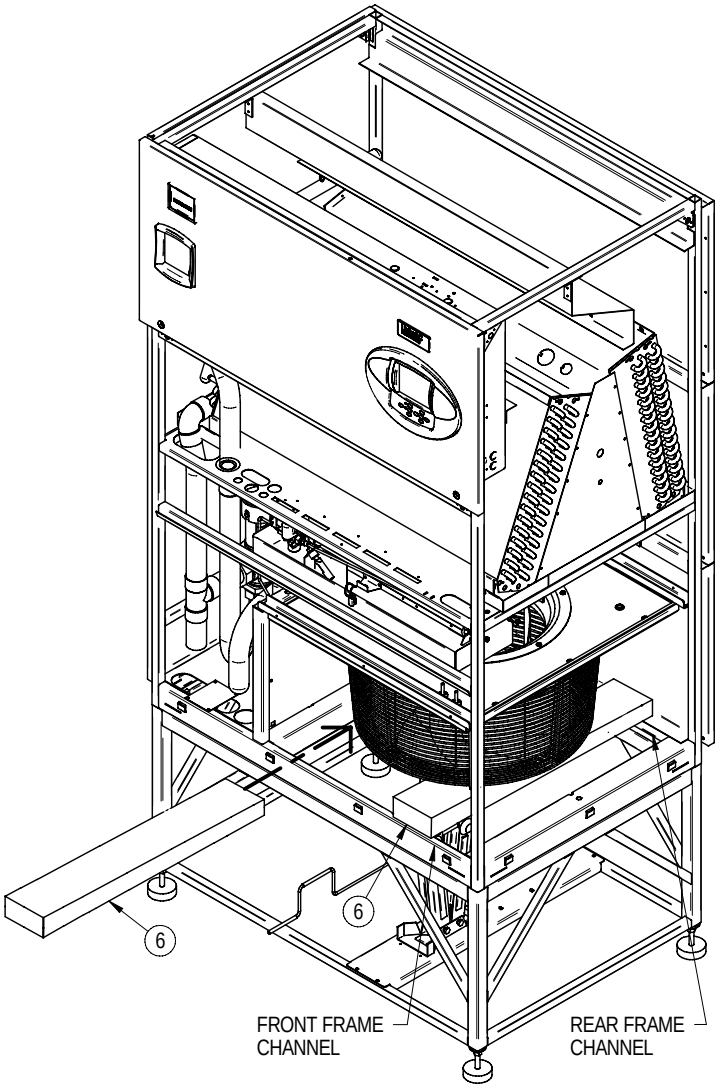
NOTE: A PROPERLY POSITIONED JACK WILL BE CENTERED BETWEEN THE FIRST AND SECOND SET OF TABS ON THE JACK SUPPORT AS SHOWN IN DETAIL "A".

4. REMOVE HARDWARE USED TO RETAIN FAN MODULE IN THE LOWERED POSITION. RETAIN HARDWARE FOR FAN MODULE RE-INSTALLATION.

NOTE: HARDWARE QUANTITY AND LOCATION WILL VARY DEPENDING ON UNIT.



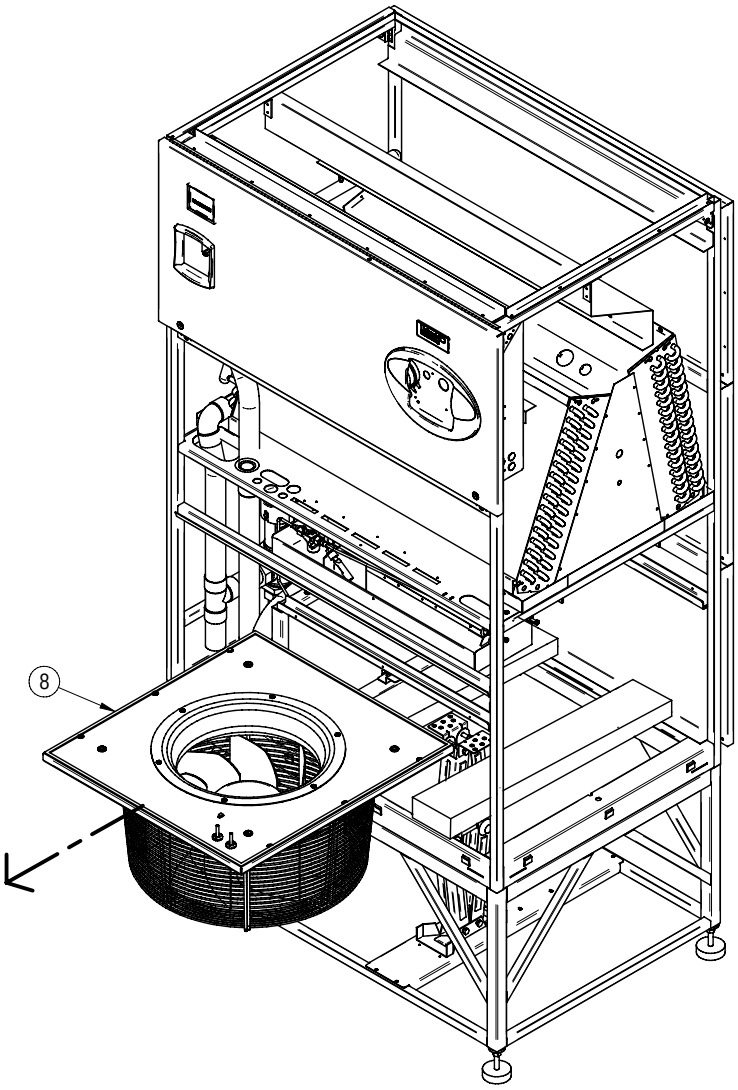

RIGHT SIDE PANEL NOT SHOWN

5. USING THE FACTORY SUPPLIED JACK AND CRANK, SLOWLY RAISE THE FAN MODULE UNTIL THE FAN MOTOR CLEARS THE FRONT FRAME CHANNEL.

6. INSERT FIELD SUPPLIED FAN REMOVAL DEVICE UNDER FAN MODULE. FIELD SUPPLIED FAN REMOVAL DEVICE SHOULD REST SECURELY ON THE FRONT AND REAR FRAME CHANNELS.

7. DISCONNECT HIGH VOLT AND LOW VOLT FAN MOTOR WIRING FROM FAN MOTOR ELECTRIC COMPONENT INSIDE OF ELECTRIC PANEL. CAREFULLY CUT CABLE TIES AS NEEDED.

NOTE: REFER TO UNIT ELECTRICAL SCHEMATIC FOR SPECIFIC WIRE ATTACHMENT POINTS.




RIGHT SIDE PANEL NOT SHOWN

8. SLIDE FAN MODULE OUT OF UNIT.

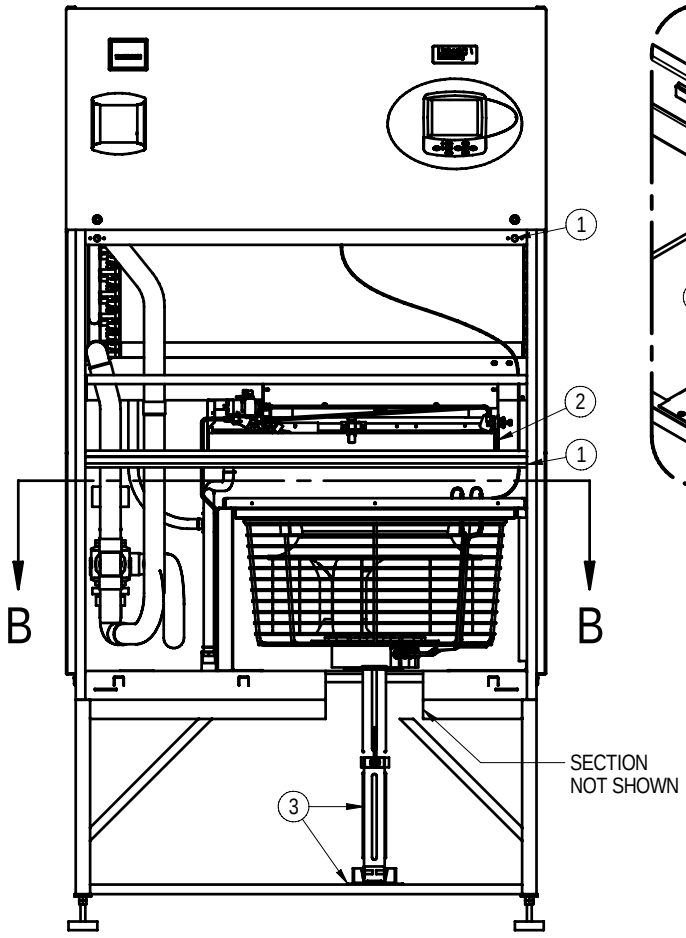
9. FOR FAN MODULE RE-INSTALLATION, FOLLOW PREVIOUS STEPS IN REVERSE ORDER. REMOVE FIELD SUPPLIED FAN REMOVAL DEVICE BEFORE RESUMING UNIT OPERIATION.

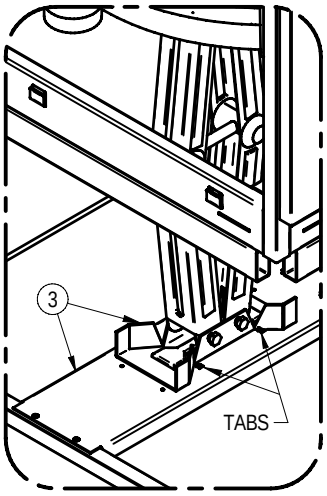
# LIEBERT
# EC FAN LOWERING PROCEDURE & BLOCK OFF PANEL KIT INSTALLATION
## DOWNFLOW MODELS WITH EC FANS

**WARNING** -RISK OF ELECTRIC SHOCK AND HIGH SPEED ROTATING FAN BLADES! CAN CAUSE INJURY OR DEATH! DISCONNECT ALL LOCAL AND REMOTE ELECTRIC POWER SUPPLIES AND VERIFY THAT FAN BLADES HAVE STOPPED ROTATING BEFORE WORKING WITHIN.

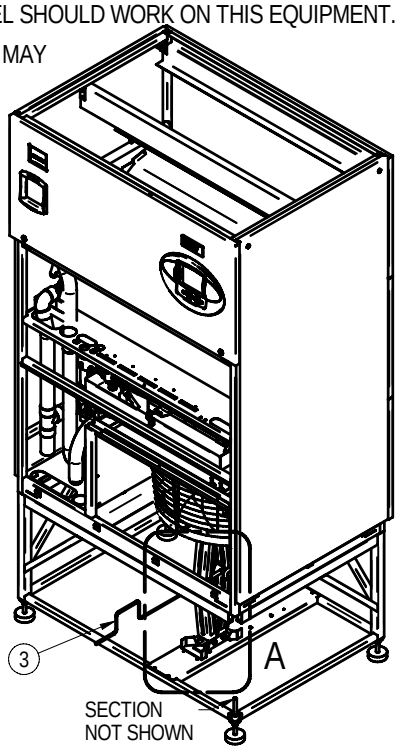
**WARNING** - RISK OF FAN MODULES DROPPING DOWNWARD SUDDENLY! CAN CAUSE INJURY OR DEATH! SUPPORT FAN MODULES BEFORE REMOVING MOUNTING HARDWARE. USE CAUTION TO KEEP BODY PARTS OUT OF THE FAN MODULES PATHWAY OF MOVEMENT DURING REPOSITIONING. ONLY QUALIFIED PERSONNEL SHOULD WORK ON THIS EQUIPMENT.

LIEBERT CW041 UNIT SHOWN WITH LIEBERT 24" FLOORSTAND. CUSTOMER UNIT MAY APPEAR DIFFERENT. READ USER MANUAL SL-18057 AND INSTRUCTION SHEET 195788 BEFORE RE-POSITIONING THE FAN MODULES.




DETAIL A
JACK LOCATION




TOOLS NEEDED: 1/2" HEX SOCKET & WRENCH
FACTORY SUPPLIED JACK, CRANK AND JACK SUPPORT
CABLE TIE CUTTER

LOWERING PROCEDURE (24" FLOOR HEIGHT MINIMUM):

1. REMOVE THE MIDDLE AND BOTTOM PANELS FROM THE FRONT OF THE UNIT.

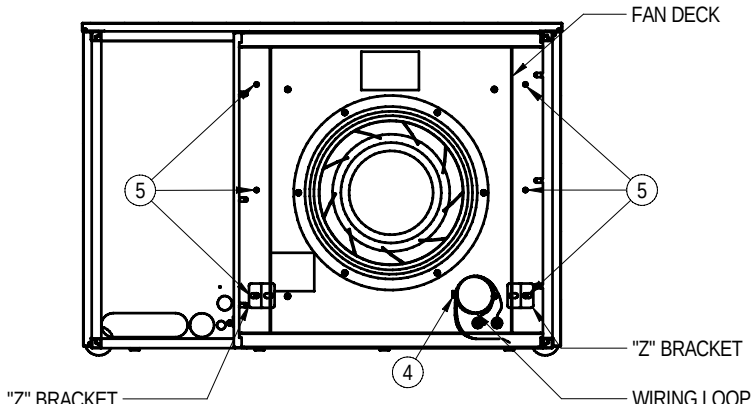
2. FOR EASE OF FAN LOWERING, REMOVAL OF THE HUMIDIFIER PAN IS RECOMMENDED.

3. POSITION THE FACTORY SUPPLIED JACK AND JACK SUPPORT UNDER THE FAN MODULE TO BE LOWERED. USING THE CRANK, RAISE THE JACK TO SAFELY SUPPORT THE FAN BEFORE REMOVING ANY HARDWARE.

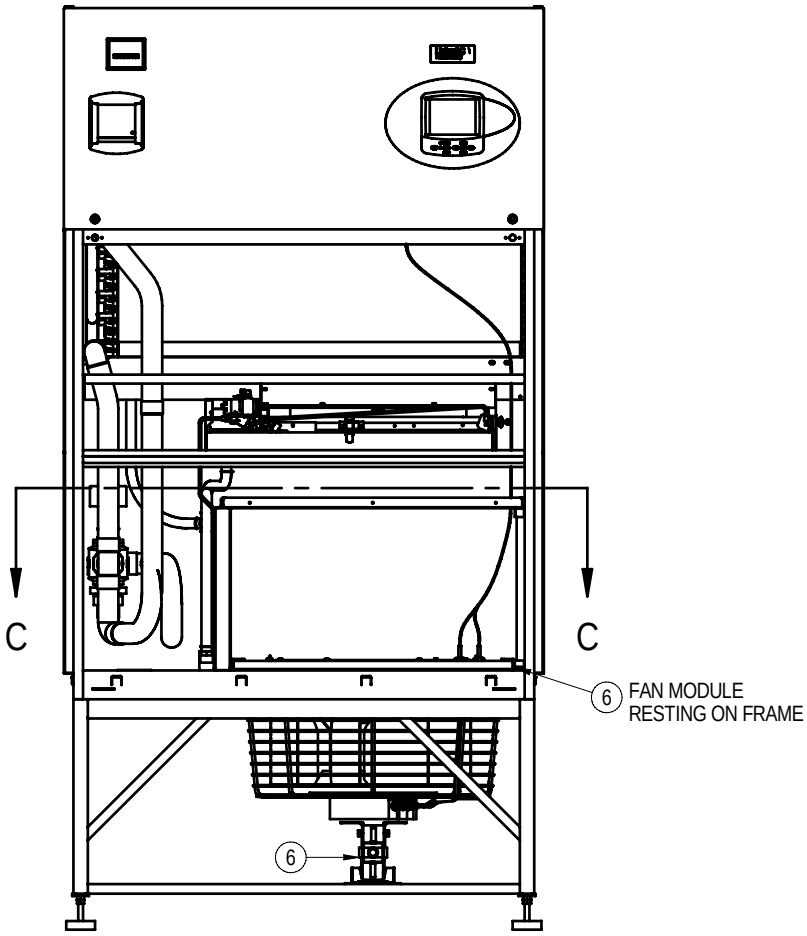
NOTE: A PROPERLY POSITIONED JACK WILL BE CENTERED BETWEEN THE FIRST AND SECOND SET OF TABS ON THE JACK SUPPORT.

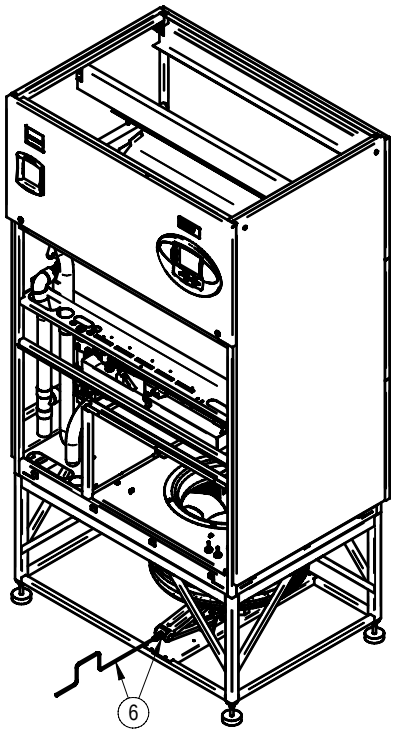
4. CUT & REMOVE THE CABLE TIE THAT RETAINS THE WIRING LOOP TO THE BLOWER MOUNTING PLATE. ALL OTHER CABLE TIES THAT ROUTE THE FAN WIRING SHOULD REMAIN INTACT.

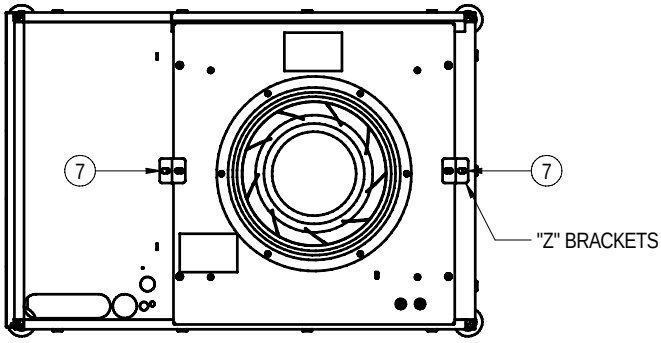
5. REMOVE THE SIX HEX-HEAD SCREWS AND "Z" BRACKETS USING A 1/2" HEX SOCKET OR WRENCH. RETAIN HARDWARE FOR LATER STEPS. "Z" BRACKETS NOT PRESENT ON LIEBERT DS, CW146 AND CW181.




SECTION B-B
TOP VIEW OF FAN DECK




SECTION C-C

FAN DECK AND SIDE PANELS
NOT SHOWN IN THIS VIEW

6. USING THE FACTORY SUPPLIED JACK AND CRANK, LOWER THE FAN MODULE UNTIL IT RESTS ON THE FRAME OF THE UNIT. USE CAUTION TO PREVENT DAMAGE TO THE FAN WIRE HARNESS.

7. CW026, CW038, CW041, CW076 THRU CW114 MODELS: USING THE HARDWARE REMOVED IN STEP 5, RE-INSTALL "Z" BRACKETS WITH HEX-HEAD SCREWS TO RETAIN FAN MODULE IN THE FULLY LOWERED POSITION.

CW051 AND CW060 MODELS: USE THE HEX-HEAD SCREWS REMOVED IN STEP 5 TO SECURE THE FAN MODULE DIRECTLY TO THE CENTER FRAME SUPPORT. SCREW CLEARANCE HOLES ARE PROVIDED IN THE FAN MODULE. THE "Z" BRACKETS WILL ONLY BE USED TO SECURE THE FAN AT THE OUTTER ATTACHMENT POINT.

LIEBERT DS, CW146 AND CW181 MODELS: USE THE HEX HEAD SCREWS REMOVED IN STEP 5 TO SECURE THE FAN MODULE DIRECTLY TO THE FRAME. SCREW CLEARANCE HOLES ARE PROVIDED IN THE FAN MODULE.

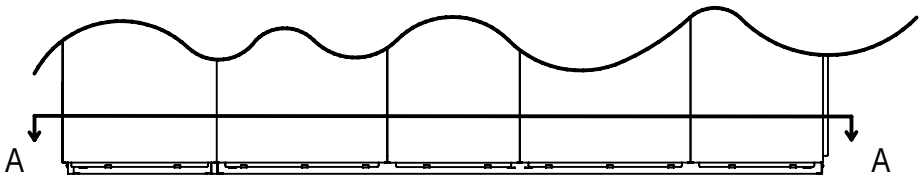
NOTE: NOT ALL HARDWARE REMOVED IN STEP 5 WILL BE USED TO RETAIN FANS IN LOWERED POSITION.

8. REPEAT STEPS 3-7 TO LOWER REMAINING FAN MODULE(S) IF PRESENT.

NOTE: THE FANS MUST BE OPERATED IN EITHER THE FULLY RAISED POSITION OR FULLY LOWERED POSITION. NO OTHER COMBINATION OF FAN POSITIONING IS SUPPORTED.

# LIEBERT DS
# PRIMARY CONNECTION LOCATIONS

## DOWNFLOW AIR COOLED 105kW (30 TONS)
## ALL COMPRESSOR MODELS WITH EC FANS



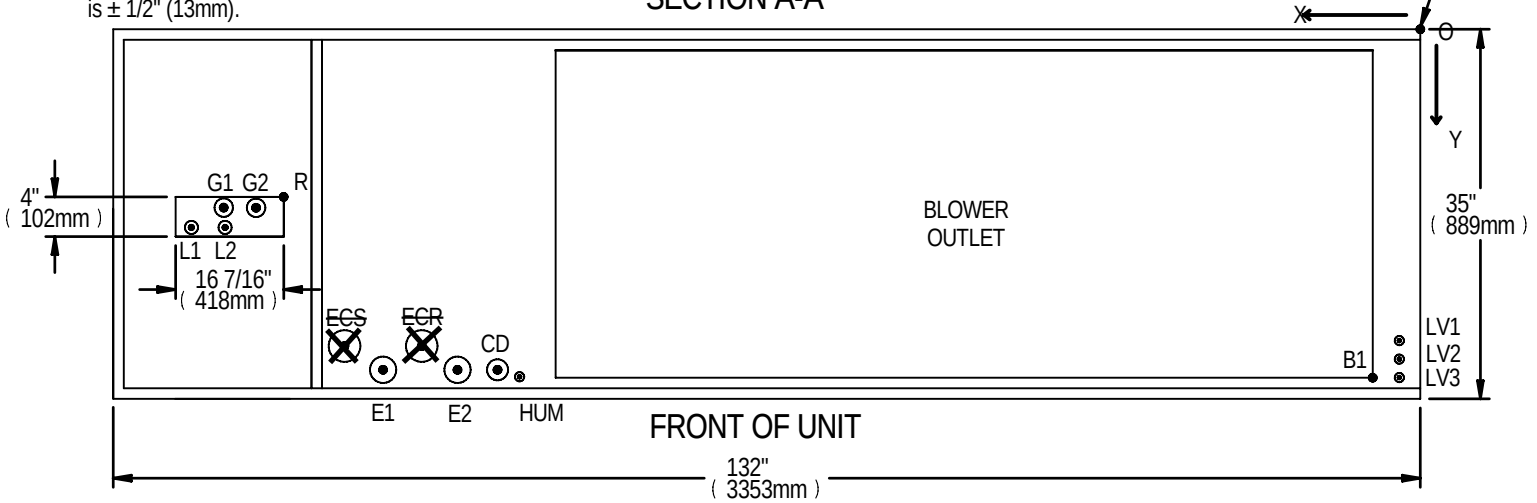

FRONT VIEW

NOTE: Drawing not to scale.

Tolerance on
all piping dimensions
is ± 1/2" (13mm).

ALL DIMENSIONS FROM
REAR CORNER OF UNIT
INCLUDING PANELS

SECTION A-A

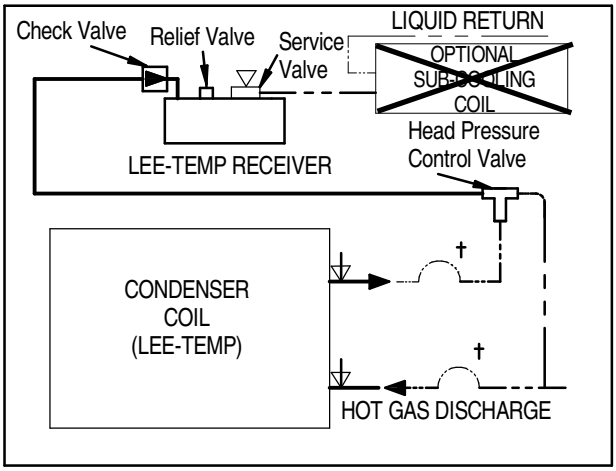



| POINT | DESCRIPTION | X | Y | CONNECTION SIZE / OPENING |
|---|---|---|---|---|
| R | REFRIGERANT ACCESS | 109" (2769mm) | 15-3/4" (400mm) | 16-7/16" (418mm) X 4" (102mm) |
| L1 | LIQUID LINE SYSTEM 1 | 121-3/4" (3092mm) | 16-3/4" (425mm) | 5/8" CU SWEAT |
| L2 | LIQUID LINE SYSTEM 2 | 118-1/8" (3000mm) | 16-3/4" (425mm) | 5/8" CU SWEAT |
| G1 | HOT GAS DISCHARGE 1 | 118-1/4" (3004mm) | 14-1/4" (362mm) | 1-1/8" CU SWEAT |
| G2 | HOT GAS DISCHARGE 2 | 115-5/8" (2937mm) | 14-1/4" (362mm) | 1-1/8" CU SWEAT |
| CD | CONDENSATE DRAIN (infrared humidifier ~~or no humidifier~~)* | 87-3/8" (2220mm) | 31" (787mm) | 3/4" FPT |
| | W/ ~~OPTIONAL~~ PUMP | 83-13/16" (2129mm) | 30" (762mm) | 1/2" CU SWEAT |
| HUM | HUMIDIFIER SUPPLY LINE | 85-5/16" (2167mm) | 32-1/2" (825mm) | 1/4" CU SWEAT |
| ~~ECS **~~ | ~~ECON-O-COIL SUPPLY~~ | ~~101-7/8" (2588mm)~~ | ~~29" (737mm)~~ | ~~2-5/8" CU SWEAT~~ |
| ~~ECR **~~ | ~~ECON-O-COIL RETURN~~ | ~~94-9/16" (2402mm)~~ | ~~29" (737mm)~~ | ~~2-5/8" CU SWEAT~~ |
| ~~HS~~ | ~~HOT WATER REHEAT SUPPLY~~ | ~~CONSULT FACTORY~~ | | |
| ~~HR~~ | ~~HOT WATER REHEAT RETURN~~ | ~~CONSULT FACTORY~~ | | |
| E1 | ELECTRICAL CONN. (HIGH VOLT) | 98-1/8" (2492mm) | 31" (788mm) | 2-1/2" |
| E2 | ELECTRICAL CONN. (HIGH VOLT) | 91" (2311mm) | 31" (788mm) | 2-1/2" |
| LV1 | ELECTRICAL CONN. (LOW VOLT) | 2" (51mm) | 29" (737mm) | 7/8" |
| LV2 | ELECTRICAL CONN. (LOW VOLT) | 2" (51mm) | 30-7/8" (784mm) | 7/8" |
| LV3 | ELECTRICAL CONN. (LOW VOLT) | 2" (51mm) | 32" (813mm) | 7/8" |
| B1 | BLOWER OUTLET | 4-1/2" (114mm) | 33" (838mm) | 77-3/8" (1965mm) X 30" (762mm) |

* Field pitch Condensate Drain line a minimum of 1/8" (3.2 mm) per foot (305 mm). All units contain a factory installed condensate trap. Do not trap external to the unit. Drain line may contain boiling water. Select appropriate drain system materials. The drain line must comply with all local codes.

** Supplied on Dual Cooling systems only (4 piping system).

# LIEBERT DS
# PIPING SCHEMATIC
## AIR COOLED SEMI-HERMETIC COMPRESSOR MODELS




**LEE-TEMP**

† Inverted Trap on discharge & liquid lines to extend above base of coil by a minimum of 7 1/2" (190mm).

OPTIONAL SUB-COOLING COIL

CONDENSER COIL (FAN SPEED or VFD)

OPTIONAL FIELD INSTALLED FUSIBLE PLUG

For rises over 25ft. (7.6m), trap every 20ft. (6m) or evenly divided*

LIQUID

Sensing Bulb

EVAPORATOR COIL

Service Valve

Cylinder Unloader(s)

SUCTION

Muffler

COMPRESSOR

Service Valve

External Equalizer

Check Valve

Field installed relief valve(s) required for 50 Hz EU CE units rated maximum 480 PSIG (33 Bar).

**Muffler

*Isolation Valve

HOT GAS DISCHARGE

Expansion Valve

Solenoid Valve

Sight Glass

Filter Drier

LIQUID RETURN

*Isolation Valve

Trap at base of risers over 5ft. (1.5m)*

NOTE: TWO REFRIGERATION CIRCUITS PROVIDED. SINGLE REFRIGERATION CIRCUIT SHOWN FOR CLARITY.

REFRIGERANT PIPING

FIELD PIPING

SERVICE / SCHRADER (ACCESS) CONNECTION NO VALVE CORE

SERVICE / SCHRADER (ACCESS) CONNECTION WITH VALVE CORE

* Components are not supplied by Liebert but are required for proper circuit operation and maintenance

** Components supplied by Liebert and must be field installed (70kW, 77 kW & 105kW models only)

NOTE: SCHEMATIC REPRESENTATION SHOWN. DO NOT USE FOR SPECIFIC CONNECTION LOCATIONS.

# LIEBERT DS ~~AND DSE~~
# ELECTRICAL FIELD CONNECTION DESCRIPTIONS
## DS, ~~DA080, AND DA085~~ MODELS

**STANDARD ELECTRICAL CONNECTIONS**

1) **Primary high voltage entrance -** 2.50" (64mm); 1.75" (44mm); 1.375" (35mm) diameter concentric knockouts located in bottom of box
2) **Secondary high voltage entrance -** 2.50" (64mm); 1.75" (44mm); 1.375" (35mm) diameter concentric knockouts located in top of box
3) **Primary low voltage entrance -** Quantity (3) 1.375" (35mm) diameter knockouts located in bottom of unit
4) **Secondary low voltage entrance -** Quantity (3) 1. 375" (35mm) diameter knockouts located in top of box
5) ~~**Three phase electrical service -** Terminals are on main fuse block (disregard if unit has optional disconnect switch). Three phase service not by Liebert.~~
6) **Earth ground -** Terminal for field supplied earth grounding wire. Earth grounding required for Liebert units.
7) **Remote unit shutdown -** Replace existing jumper between terminals 37 & 38 with field supplied normally closed switch having a minimum 75VA, 24VAC rating. Use field supplied Class 1 wiring.
8) **Customer alarm inputs -** Terminals for field supplied, normally open contacts, having a minimum 75VA, 24VAC rating, between terminals 24 & 50, 51, 55, 56. Use field supplied Class 1 wiring. Terminal availability varies by unit options.
9) **Common alarm -** On any alarm, normally open dry contact is closed across terminals 75 & 76 for remote indication. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.
10) **Heat rejection interlock -** On any call for compressor operation, normally open dry contact is closed across terminals 70 & 71(circuit 1), 230 (circuit 2) to heat rejection equipment. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring. When DS unit is paired with a Liebert MC series condenser, remove jumper between terminal 71 and terminal 230. Three wires must connect terminals 70, 71 and 230 of the indoor unit to terminals 70, 71 and 230 of the Liebert MC series condenser. ~~Liebert DSE units must be connected to Liebert MC series condenser with premium control. It is required that the jumper between terminal 71 and terminal 230 be removed. Three wires must connect terminals 70, 71, and 230 of the indoor unit to terminals 70, 71 and 230 of the Liebert MC series condenser.~~

**CANBUS ELECTRICAL CONNECTIONS**

11) **CANBus Connector–** Terminal block with terminals 49-1 (CAN-H) and 49-3 (CAN-L) + SH (shield connection). The terminals are used to connect the CANBus communication cable (provided by others) from the indoor unit to the Liebert Microchannel Condenser – Premium Model and Optional PRE Unit
12) **CANBus Cable** – CANBus cable provided by others to connect to the outdoor condenser. Cable must have the following specifications:
    a) Conductors – 22-18AWG stranded tinned copper
    b) Twisted Pair
    c) Braided shield or Foil shield with Drain Wire
    d) Low Capacitance – 15pf/ft or less
    e) UL Approved Temperature rated to 75°C
    f) UL Approved Voltage rated to 300V
    g) UV and Moisture resistant if not provided in conduit
    h) Plenum rated – NEC type CMP (if required by national or local codes.)

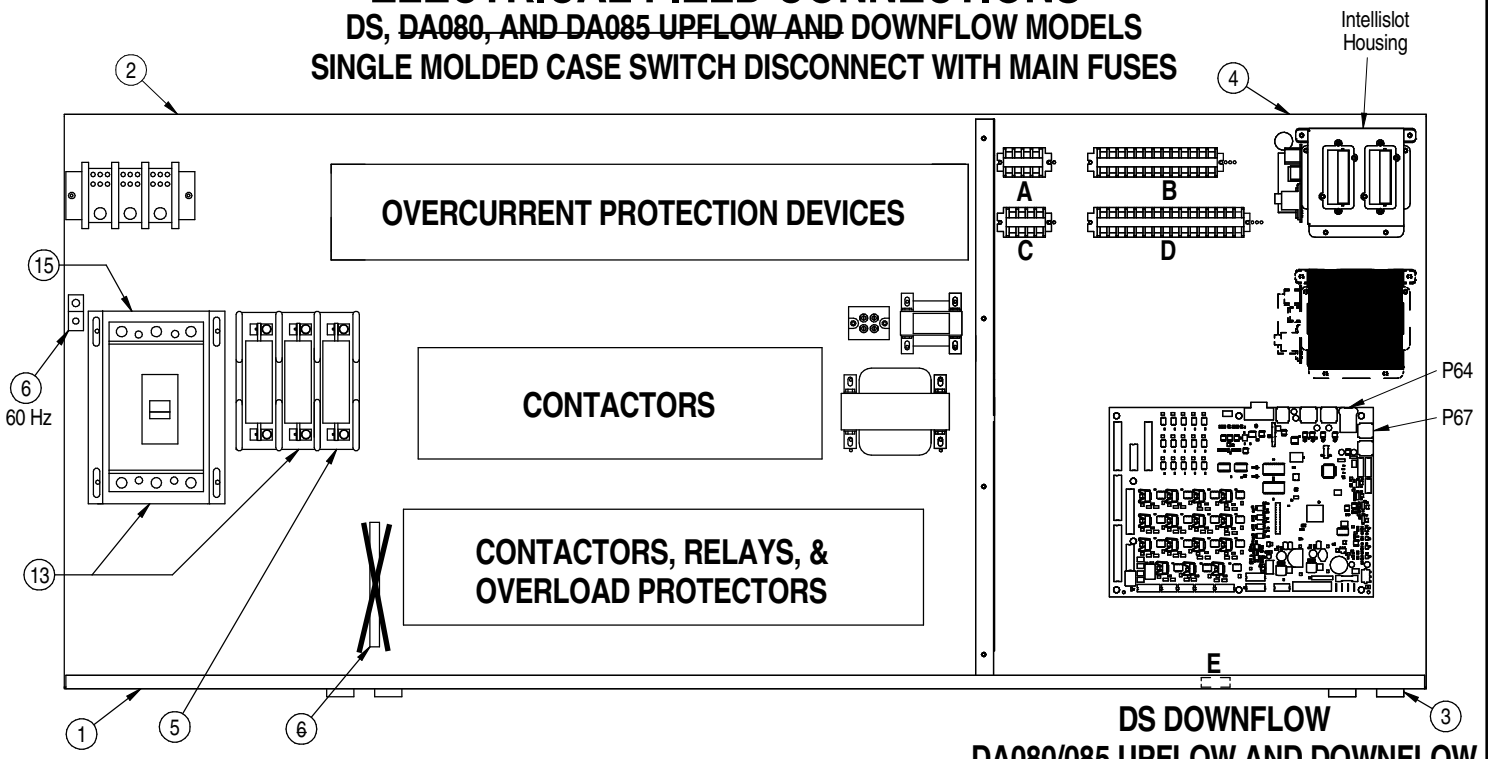
**OPTIONAL ELECTRICAL CONNECTIONS**

13) **Unit factory installed disconnect switch, Fuse Block and Main Fuses –** Two types of disconnect switches are available – "Non-Locking" and "Locking". The "~~Non-Locking Type~~" consists of a non-automatic molded case switch operational from the outside of the unit. Access to the high voltage electric panel compartment can be obtained with the switch in either the "on" or "off" position. The "Locking Type" is identical except access to the high voltage electric panel compartment can be obtained only with the switch in the "off" position. Units with fused disconnects are provided with a defeater button that allows access to the electrical panel when power is on. The molded case switch disconnect models contain separate main fuses. Units with fused disconnect have main fuses within the disconnect. Only fused disconnects are used on dual disconnect options.
14) ~~**Secondary disconnect switch and earth ground**~~
15) **Three phase electrical service -** Terminals are on top of disconnect switch. Three phase service not by Liebert
16) **Smoke sensor alarm - Factory** wired dry contacts from smoke sensor are 91-common, 92-NO, and 93-NC. Supervised contacts, 80 & 81, open on sensor trouble indication. This smoke sensor is not intended to function as, or replace, any room smoke detection system that may be required by local or national codes. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.
17) **Reheat and humidifier lockout -** Remote 24VAC required at terminals 82 & 83 for lockout of reheat and humidifier.
18) **Condensate alarm** (with condensate pump ~~option~~) - On pump high water indication, normally open dry contact is closed across terminals 88 & 89 for remote indication. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.
19) ~~**Remote humidifier -** On any call for humidification, normally open dry contact is closed across terminals 11 & 12 to signal field supplied remote humidifier. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.~~
20) ~~**Auxiliary cool contact -** On any call for econ-o-coil operation, normally open dry contact is closed across terminals 72 & 73 on dual cool units only. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.~~

**OPTIONAL LOW VOLTAGE TERMINAL PACKAGE CONNECTIONS**

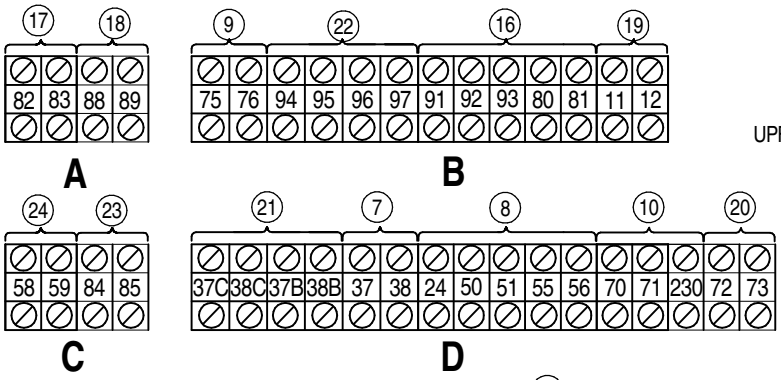
21) **Remote unit shutdown -** Two additional contact pairs available for unit shutdown (labeled as 37B & 38B, 37C & 38C). Replace jumpers with field supplied normally closed switch having a minimum 75VA, 24VAC rating. Use field supplied Class 1 wiring.
22) **Common alarm -** On any alarm, two additional normally open dry contacts are closed across terminals 94 & 95 and 96 & 97 for remote indication. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.
23) **Main fan auxiliary switch -** On closure of main fan contactor, normally open dry contact is closed across terminals 84 & 85 for remote indication. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.
24) **LiquiTect shutdown and dry contact -** On LiquiTect activation, normally open dry contact is closed across terminals 58 & 59 for remote indication (LiquiTect sensor ordered separately). 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.

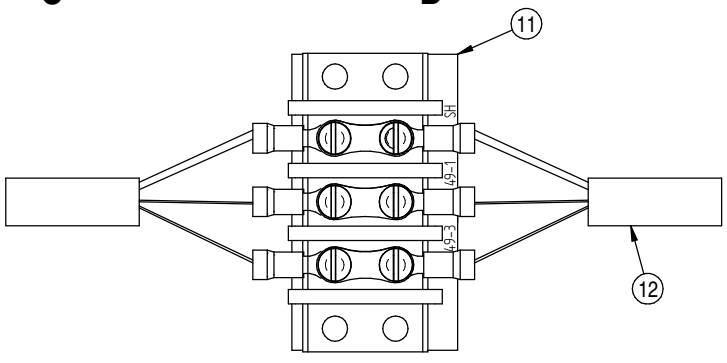
# LIEBERT DS ~~AND DSE~~
# ELECTRICAL FIELD CONNECTIONS
## DS, ~~DA080, AND DA085 UPFLOW AND~~ DOWNFLOW MODELS
## SINGLE MOLDED CASE SWITCH DISCONNECT WITH MAIN FUSES




**DS DOWNFLOW**
**~~DA080/085 UPFLOW AND DOWNFLOW~~**
**LOW VOLT SECTION**

Note: Typical orientation of components shown. Component location varies by option and unit size.

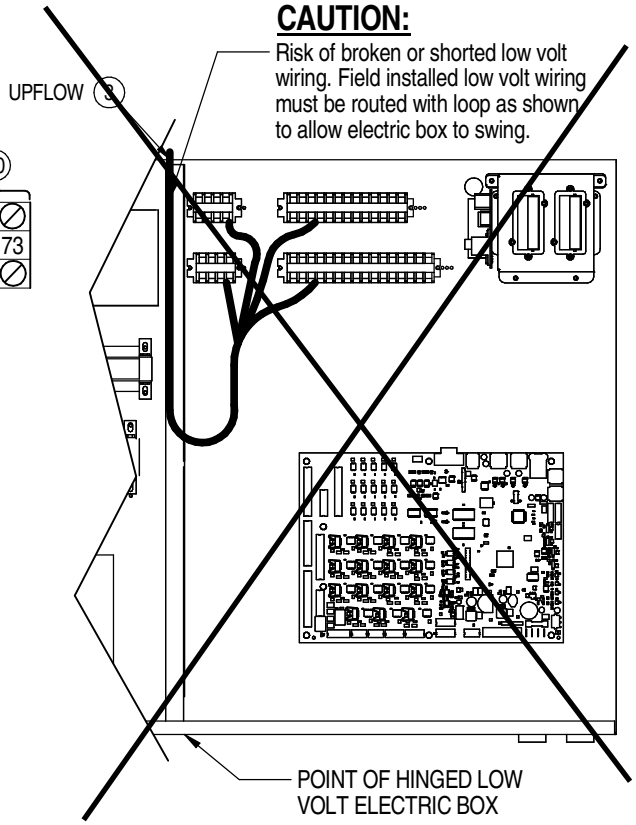



### Item 12 Installation Conditions

1. Follow all local installation codes.
2. Do not run CAN cables in same conduit, raceway, or chase as high voltage wires (120-600V).
3. Separate high volt wires from CAN wires by 12 inches.
4. For runs greater than 350ft(107m), contact Liebert factory.

**CAUTION:**
Risk of broken or shorted low volt wiring. Field installed low volt wiring must be routed with loop as shown to allow electric box to swing.

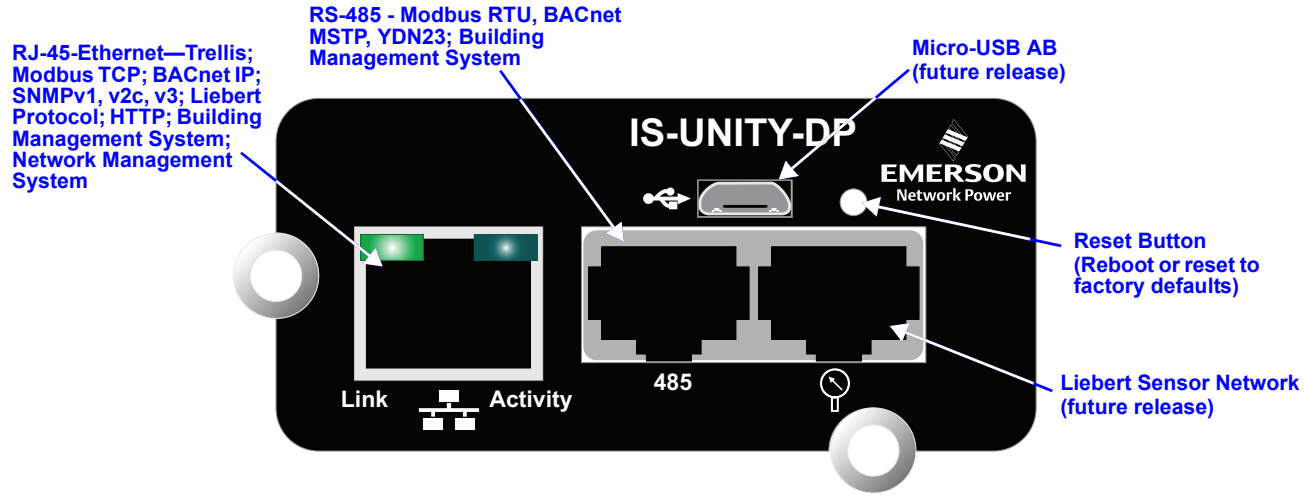



**~~DS UPFLOW LOW VOLTSECTION~~**

# LIEBERT® INTELLISLOT® UNITY PLATFORM CARDS

## Product Specification/Installation Sheet

*Liebert Intellislot Unity cards are a form, fit and function replacement for several existing Liebert Intellislot Web and 485 cards.*




## Description

The Liebert IntelliSlot Unity Platform brings SNMP, BACnet IP, BACnet MSTP, Modbus TCP, Modbus RTU, YDN23 and Web management capability to many models of Emerson Network Power's power and cooling equipment. The cards employ Ethernet and RS-485 networks to monitor and manage a wide range of operating parameters, alarms and notifications.

See **Table 1** for equipment supported and **Table 2** for communication protocols supported.

## Additional Features

- SNMPv1, SNMPv2c and SNMPv3 with MIB-II support
- HTTP/HTTPS 1.1
- BootP
- DHCP per RFC2131/2132
- Remote firmware updates via a Web browser
- IPv4 and IPv6

## Compatibility With Other Emerson Products and Communication Protocols

**Table 1 Compatibility with Liebert equipment**

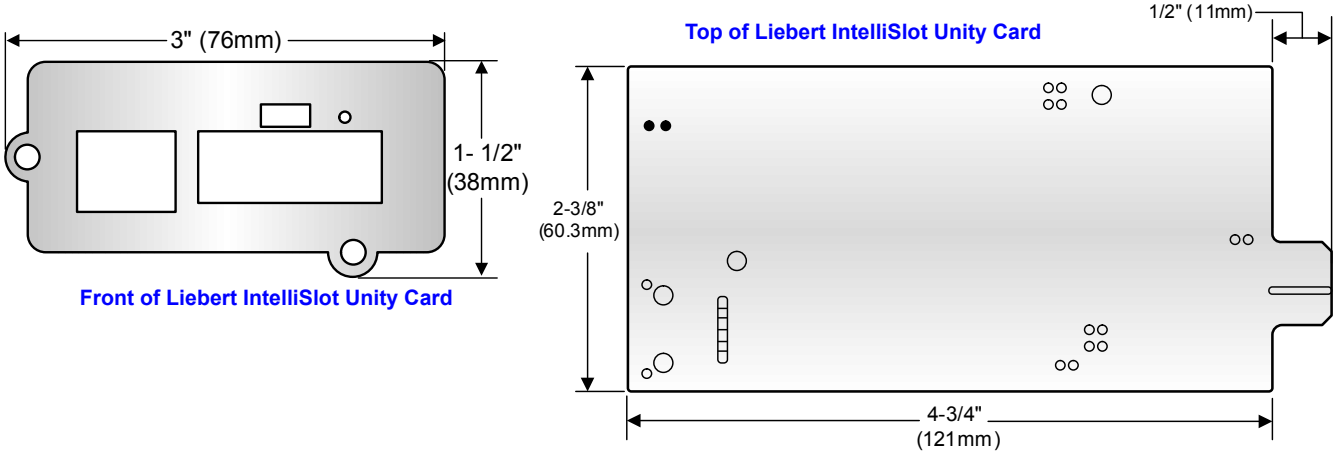
| Liebert IntelliSlot Card | Compatible with: |
|---|---|
| Liebert IS-UNITY-DP<br>~~Liebert IS-UNITY-LIFE~~ | Liebert APM™, Liebert APS™, Liebert CRV™, Liebert GW™, Liebert Challenger 3000™<br>Liebert DCP™, Liebert Deluxe System/3™, Liebert DS™, Liebert DSE™, Liebert HPC™<br>Liebert HPC-S/M/R/W/Generic™, Liebert HPM™, Liebert NXC™, Liebert NXL™ *, Liebert NXR™,<br>Liebert PCW™/PDX™, Liebert PeX™ *, Liebert XDC™, Liebert XDP™, Liebert XDP-Cray™ |

**Table 2 Liebert IntelliSlot card communication protocols**

| Liebert IntelliSlot Card (Part #) | Communication Protocol | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | HTTP HTTPS | Emerson Protocol | Remote Service Delivery Protocol | Email | SMS | SNMP v1, v2c, v3 | BACnet IP BACnet MSTP | Modbus TCP Modbus RTU | YDN23 * |
| Liebert IS-UNITY-DP (IS-UNITY-DP) | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| Liebert IS-UNITY-LIFE (IS-UNITY-LIFE) | ✔ | ✔ | ✔ | — | — | — | — | — | — |

* YDN23 supported only for Liebert PeX and Liebert NXL.

## Dimensions




## Specifications

| | | |
|---|---|---|
| **Power Requirements** | DC Inputs | • 7 to 12VDC |
| | Power Consumption | • 3.6W maximum |
| **Dimensions - W x D x H: in. (mm)** | | • 2.97 x 5.2 x 1.45 (75.5 x 15 x 37) |
| **Weight** | Net, oz. (kg) | • 7 (0.2) |
| | Shipping, lb. (kg) | • 1.3 (0.6) |
| **Ambient Operating Environment, °F (°C)** | | • 32 to 104 (0 to 40); 10% to 90% RH (non-condensing) |
| **Ambient Storage Temperature, °F (°C)** | | • -4 to 140 (-20 to 60) |
| **Communication Ports** | Ethernet Communications | • RJ-45 |
| | RS-485 | • RJ-45 (RJ-45 to 2-Position Terminal Block Adapter) |

## Wiring Specifications

| Connection | Supported Wire Type | Maximum Wire Length |
|---|---|---|
| 10/100Mb/s Ethernet Connector | Standard Category 5E Cable | 328 ft. (100m) |
| RJ-45 - One-Wire Connector | Liebert® Integrated One-Wire Sensor Cable or 2m Cat 5E to Modular 1-Wire Sensor. | 65.6 ft. (20m) |
| RJ-45 - RS-485 Connector | ADAPTER RJ45-2POS TERMINAL BLOCK EIA485 to 18-22 AWG Stranded & Shielded **18 AWG recommended** Non Plenum - Belden 9461 Plenum - Belden 88761 | 3000 ft. (914m) |
| Micro-USB AB | Standard Micro-USB AB | 16.4 ft. (5m) |


**Liebert Corporation**

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Facsimile: 1-614-841-6022
www.liebert.com


EMERSON Network Power




SL-52646_REV4_06-14

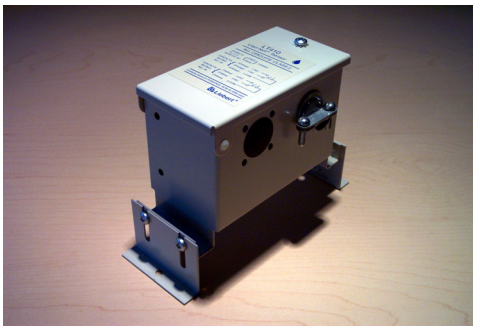
# LIEBERT LIQUI-TECT® 410

**Point Leak Detection Sensor**

***Product Specification Sheet***

## Description

The Liebert Liqui-tect 410 (LT410) provides a single-point detection of leaks. The point detection sensor has two gold-plated sensing probes to prevent corrosion resistance and to provide accurate readings. The LT410 constantly monitors points for leaks, internal faults and power failures and warns of any abnormal conditions. Mounting brackets allow for sensor height adjustment and leveling.



The LT410 is the ideal solution for sensing leaks under a raised computer floor or air conditioning drip pans. Two independent outputs provide added flexibility with the capacity to signal both a local alarm panel and a remote building management system or external equipment, such as motorized water shut-off valves.

The LT410 is also ideally suited for the following:

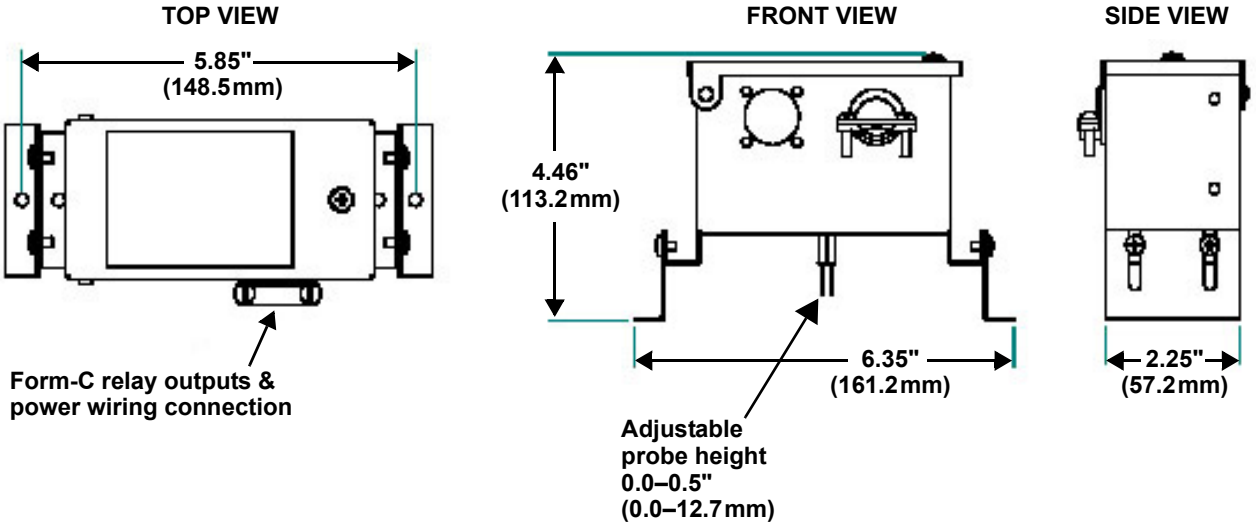
### Applications

- Glycol, Chilled Water Cooling
- Humidification Feed Water Piping
- Condensate Pumps and Drains
- Unit and Ceiling Auxiliary Drip Pans
- Overhead Piping Troughs

### Locations

- Large-Scale Network Control Centers
- Data Centers
- Server Rooms - Closets
- Unattended Remote Shelters
- Mechanical Equipment Rooms
- Sensitive Areas With Overhead Piping
- Industrial Process Control Rooms

## Dimensions - Top, Front & Side Views

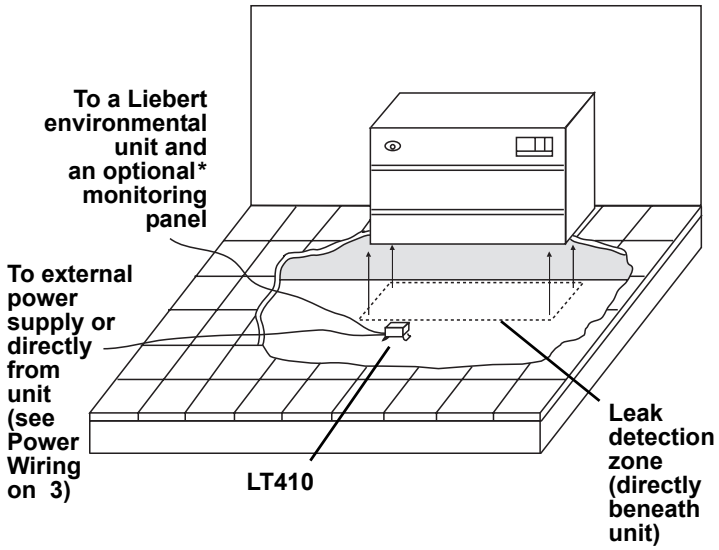



**Shipping weight:** 2 lbs (0.9 kg)
**Mounting holes:** #8 screws

## Specifications

| Liqui-tect 410 Sensor | |
|---|---|
| Power requirements | 24 VAC 100 mA, 50/60 Hz, 3 VA (max.) |
| Dimensions, in. (mm) W x D x H | 6.35" x 2.25" x 4.46" (161.2 x 57.2 x 113.2) |
| Weight (assembled) | 2.0 lb. (0.9 kg) |
| Metal enclosure | NEMA 1, IP 30 |
| **Environmental Conditions** | |
| Operating temperature | 50°F to 104°F (10°C to 40°C) |
| Operating humidity | 10% to 95% relative humidity (non-condensing) |
| Operating altitude | 0 to 10,000 ft. (0 to 3,048 m) |
| **Output Relays** | |
| Contact rating | 2 Form-C; 3 A rating at 24 VAC |
| **Agency Listings** | |
| UL | UL916 |
| C-UL | C22.2, No. 205-M1983 |
| CE | Yes |
| FCC Compliance | 47 CFR, Part 15 |

## Placement on Subfloor Under Cooling Support Equipment

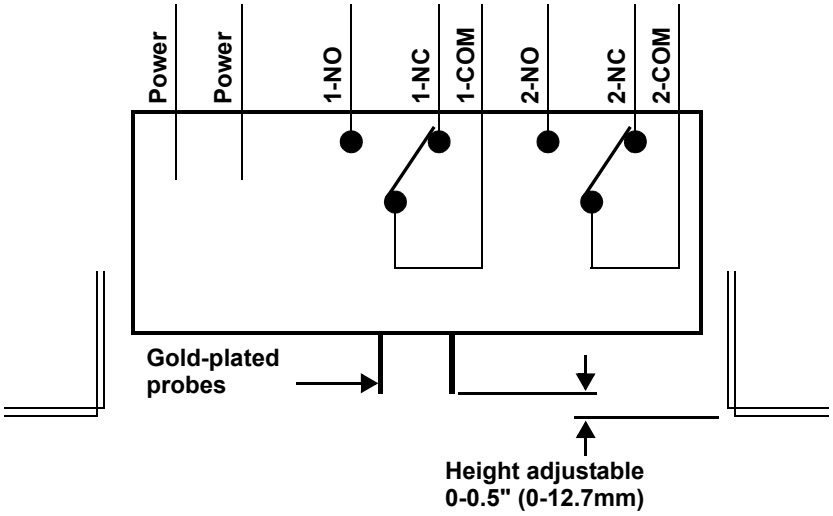



* Output connections to external alarm monitoring panels such as the Liebert contact closure alarm panels

## Wiring Interconnections

***(Circuits shown in powered, non-alarm state)***

| Red Wires | Orange Wires | Yellow Wires |
|---|---|---|
| 24 V, AC/DC | Alarm Contact Rating | Alarm Contact Rating |
| @ 0.10A, 50-60 Hz, DC | 24 VAC @ 3A | 24 VAC @ 3A |
| Class 2 Circuit Only | Class 2 Circuit Only | Class 2 Circuit Only |




**NOTE:** All power and alarm connections Class 2 circuits only

## Power Wiring

The LT410 is rated for 24 VAC, 50/60 Hz and 0.10 amp.

**Figure 1 24V from Liebert environmental units to LT410**

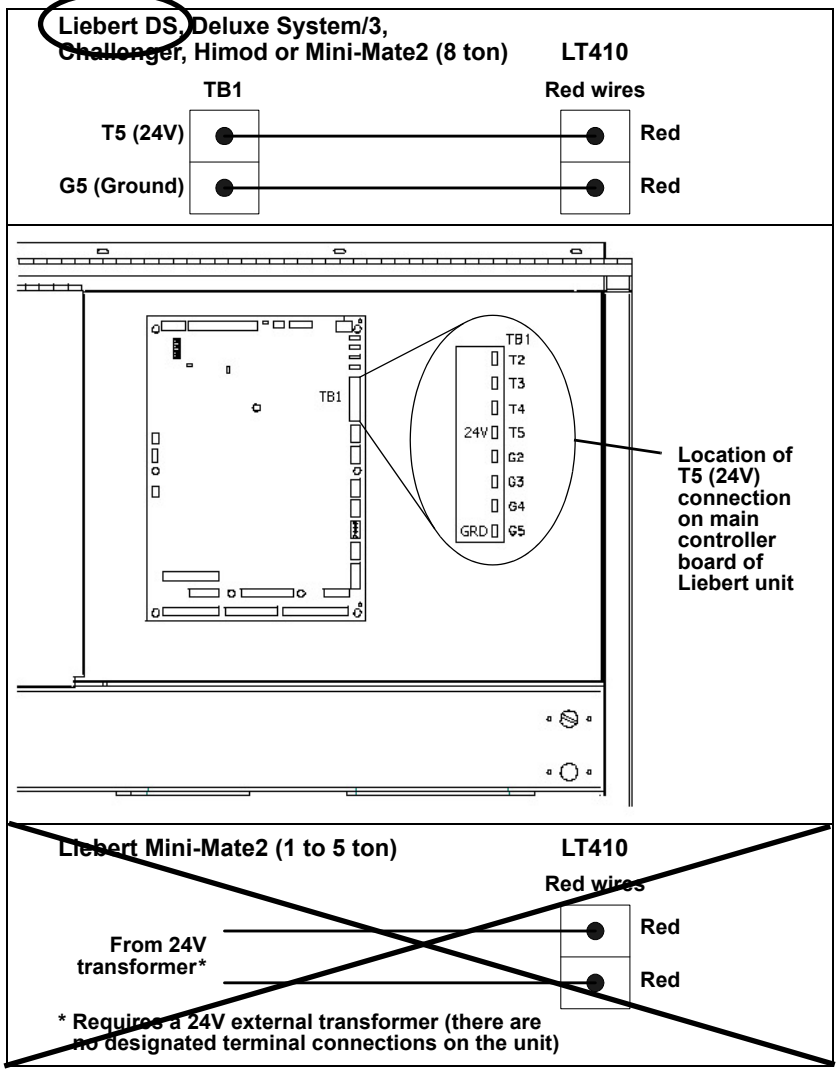
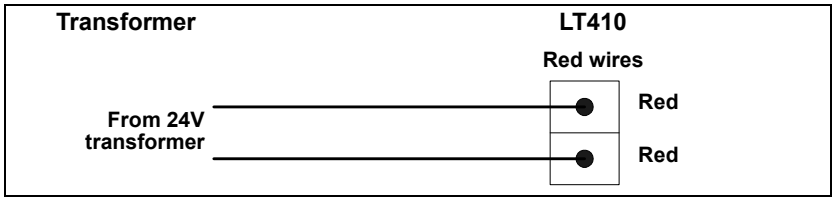



**Figure 2 24V from transformer to LT410**



## Wiring to Auxiliary Alarm Panels

The LT410 has two Form-C dry contact alarm output contacts: orange wires (1) and yellow wires (2). Each contact is rated for 24 VAC at 3 amp.

**Figure 3 LT410 to Liebert environmental units**

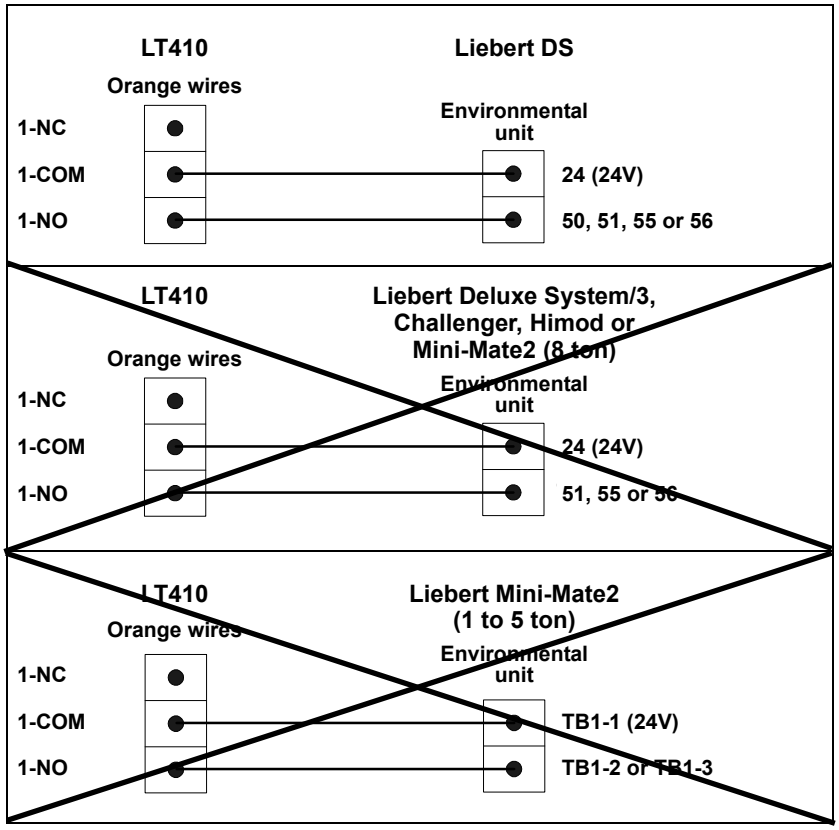
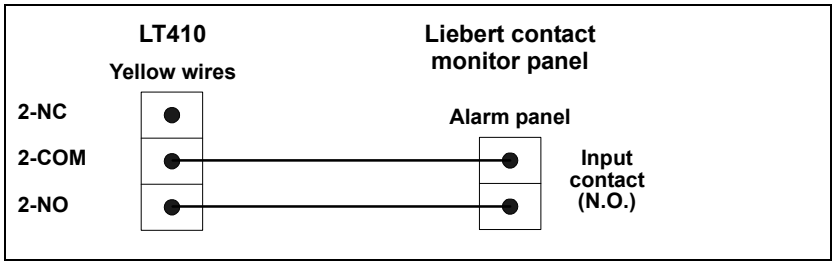



**Figure 4 LT410 to Liebert contact monitor panel**




## Ordering Information

| Product Number | Quantity | Description |
|---|---|---|
| LT410 | 4 | Point Leak Detection Sensor |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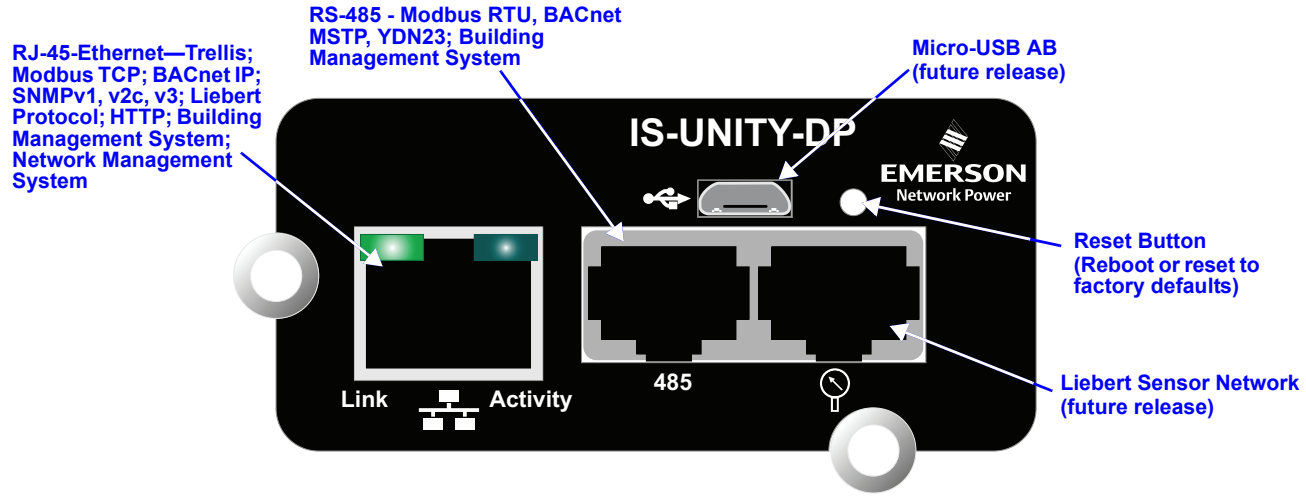
SL-31050_REV0_06-07

# LIEBERT® INTELLISLOT® UNITY PLATFORM CARDS

## Product Specification/Installation Sheet

*Liebert Intellislot Unity cards are a form, fit and function replacement for several existing Liebert Intellislot Web and 485 cards.*




## Description

The Liebert IntelliSlot Unity Platform brings SNMP, BACnet IP, BACnet MSTP, Modbus TCP, Modbus RTU, YDN23 and Web management capability to many models of Emerson Network Power's power and cooling equipment. The cards employ Ethernet and RS-485 networks to monitor and manage a wide range of operating parameters, alarms and notifications.

See **Table 1** for equipment supported and **Table 2** for communication protocols supported.

## Additional Features

- SNMPv1, SNMPv2c and SNMPv3 with MIB-II support
- HTTP/HTTPS 1.1
- BootP
- DHCP per RFC2131/2132
- Remote firmware updates via a Web browser
- IPv4 and IPv6

## Compatibility With Other Emerson Products and Communication Protocols

**Table 1 Compatibility with Liebert equipment**

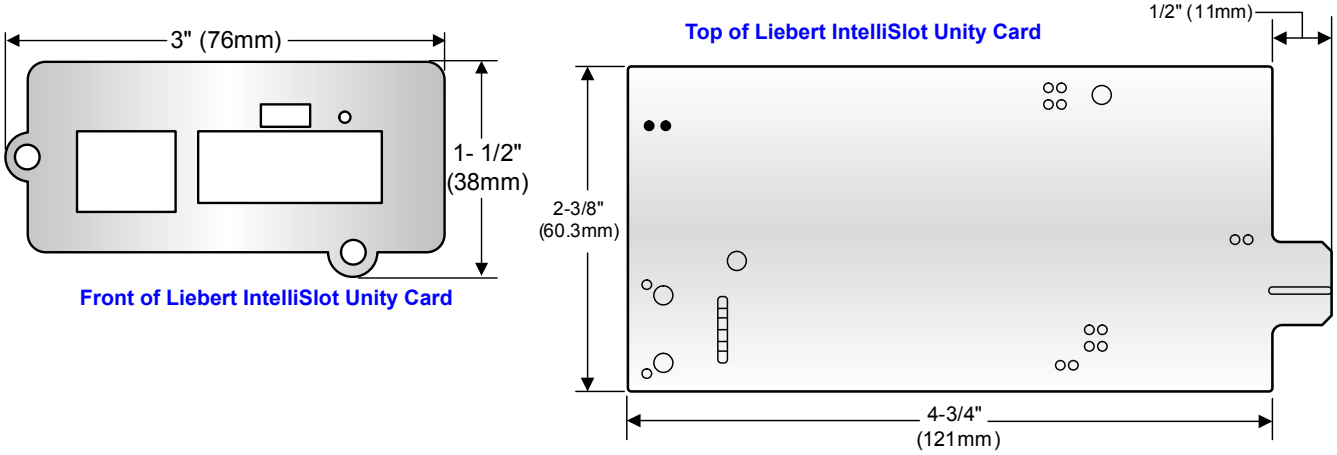
| Liebert IntelliSlot Card | Compatible with: |
|---|---|
| Liebert IS-UNITY-DP<br>Liebert IS-UNITY-LIFE | Liebert APM™, Liebert APS™, Liebert CRV™, Liebert CW™, Liebert Challenger 3000™<br>Liebert DCP™, Liebert Deluxe System/3™, Liebert DS™, Liebert DSE™, Liebert HPC™<br>Liebert HPC-S/M/R/W/Generic™, Liebert HPM™, Liebert NXC™, Liebert NXL™ *, Liebert NXR™,<br>Liebert PCW™/PDX™, Liebert PeX™ *, Liebert XDC™, Liebert XDP™, Liebert XDP-Cray™ |

**Table 2 Liebert IntelliSlot card communication protocols**

| Liebert IntelliSlot Card (Part #) | Communication Protocol | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | HTTP HTTPS | Emerson Protocol | Remote Service Delivery Protocol | Email | SMS | SNMP v1, v2c, v3 | BACnet IP BACnet MSTP | Modbus TCP Modbus RTU | YDN23 * |
| Liebert IS-UNITY-DP (IS-UNITY-DP) | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| Liebert IS-UNITY-LIFE (IS-UNITY-LIFE) | ✔ | ✔ | ✔ | — | — | — | — | — | — |

* YDN23 supported only for Liebert PeX and Liebert NXL.

## Dimensions




## Specifications

| | | |
|---|---|---|
| **Power Requirements** | DC Inputs | • 7 to 12VDC |
| | Power Consumption | • 3.6W maximum |
| **Dimensions - W x D x H: in. (mm)** | | • 2.97 x 5.2 x 1.45 (75.5 x 15 x 37) |
| **Weight** | Net, oz. (kg) | • 7 (0.2) |
| | Shipping, lb. (kg) | • 1.3 (0.6) |
| **Ambient Operating Environment, °F (°C)** | | • 32 to 104 (0 to 40); 10% to 90% RH (non-condensing) |
| **Ambient Storage Temperature, °F (°C)** | | • -4 to 140 (-20 to 60) |
| **Communication Ports** | Ethernet Communications | • RJ-45 |
| | RS-485 | • RJ-45 (RJ-45 to 2-Position Terminal Block Adapter) |

## Wiring Specifications

| Connection | Supported Wire Type | Maximum Wire Length |
|---|---|---|
| 10/100Mb/s Ethernet Connector | Standard Category 5E Cable | 328 ft. (100m) |
| RJ-45 - One-Wire Connector | Liebert® Integrated One-Wire Sensor Cable or 2m Cat 5E to Modular 1-Wire Sensor. | 65.6 ft. (20m) |
| RJ-45 - RS-485 Connector | ADAPTER RJ45-2POS TERMINAL BLOCK EIA485 to 18-22 AWG Stranded & Shielded **18 AWG recommended** Non Plenum - Belden 9461 Plenum - Belden 88761 | 3000 ft. (914m) |
| Micro-USB AB | Standard Micro-USB AB | 16.4 ft. (5m) |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EMERSON Network Power




SL-52646_REV4_06-14

# LIEBERT MC

# PREMIUM EFFICIENCY CONTROL

**STANDARD FEATURES**

**COIL** Liebert microchannel coils are all-aluminum construction. Tubes are created by extruding small parallel refrigerant flow paths into aluminum. Full-depth louvered aluminum fins fill spaces between the tubes. Tubes, fins and aluminum headers are oven-brazed to form a complete refrigerant-to-air heat exchange coil. Baffles are used in the headers to separate one coil slab into multiple passes as needed. Coils are factory leak tested at a minimum of 300 PSIG and dehydrated. Copper stub pipes are electric resistance welded to aluminum coils and joints are protected with polyolefin to seal joint from environmental corrosive elements. Hot gas and liquid lines are brazed to the stub pipes with spun closed ends for customer piping connections. Coil pipe assembles are filled and sealed with a nitrogen holding charge for shipment. One coil is used per fan assembly.

**FAN/MOTOR ASSEMBLY** The fan/motor assembly is complete with external rotor motor, fan blades and fan/finger guard. Fan blades are constructed of stamped aluminum or steel extrusion coated with PP plastic. Fan guards are heavy gauge, close meshed, steel wire, coated with a black corrosion resistant finish. Fan terminal blocks located on the top of the fan guard with IP54 protection class. Fans are factory balanced and tested before shipment.

**Fan Motors** Fan motors are specifically designed for variable speed and have ball bearings. The EC fans provide internal overload protection through the built-in electronics. Each EC fan motor has built-in controller and communication module, linked via RS485 communication wire to each fan and the Premium Control Board. This allows each fan to receive and respond to precise fan speed inputs from the Premium control board.

**PREMIUM EFFICIENCY FAN CONTROL** The Liebert premium efficiency condenser control system is complete with control board, EC fan motor(s),refrigerant-pressure transducer(s), refrigerant-temperature thermistor(s), ambient-temperature thermistor, and motor overload protection in the factory wired control panel. The control board maintains EC fans on the same circuit to the same speed in order to maintain refrigerant head pressure. The control board receives a run signal from the compressor of the indoor unit via field-supplied low voltage interlock wires and field-supplied CANbus communication wires from the indoor unit iCOM. The control system provides refrigerant head pressure and system starting for outdoor ambient temperature as low as -30°F (-35 °C), provided the total temperature design range (from minimum to maximum) is 125°F (70°C) or less.

**HOUSING** The condenser housing is constructed of bright aluminum sheet and divided into individual fan sections by full width baffles. Internal structural support members, including coil support frame, are galvanized steel for strength and corrosion resistance. Panel doors are provided on two sides of each coil/fan section to provide for coil cleaning. Aluminum legs are provided with rigging holes for hoisting the unit into position.

**COMMUNICATION** The Premium Efficiency Control communicates with the iCOM control of the indoor Liebert unit using field supplied CANbus wires. The communication link allows for condenser alarm condition communication to iCOM, communication of other measurable items on the condenser, and fan control features to improve efficiency, sound and wintertime operation based on iCOM programming.

**UNIT DISCONNECT SWITCH** Locking unit disconnect switch is factory installed and wired in attached condenser control section.

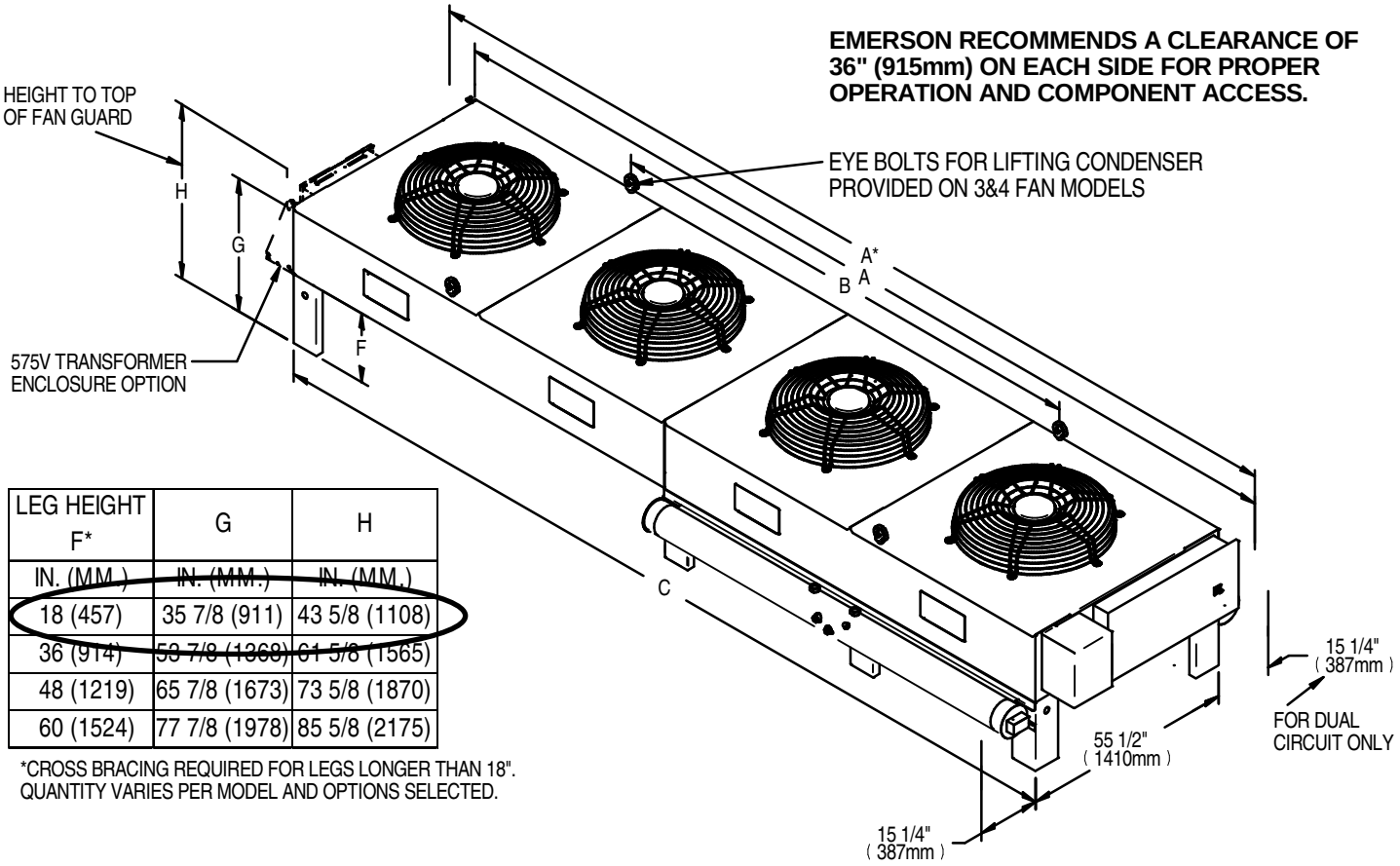
**OPTIONAL FEATURES**

**LIEBERT LEE-TEMP LOW AMBIENT CONTROL** Lee-Temp receiver kits can be added to achieve head pressure control down to minimum ambient temperatures of -30 °F (-34 °C). The premium efficiency fan control when used with the Liebert Lee-Temp receiver kits runs the fan(s) at lower speeds during cold temperatures saving fan energy.

~~**575V POWER SUPPLY** The factory installed condenser option will include a secondary enclosure, a 575V-to-480V, 3 phase, step down transformer, secondary fuses for the transformer, and all wiring between the main and secondary electrical enclosures. Site power connections will be made in the main electrical enclosure and the secondary enclosure will be located on the condenser end opposite of the main electrical enclosure.~~

# LIEBERT MC
# CABINET & ANCHOR DIMENSIONAL DATA

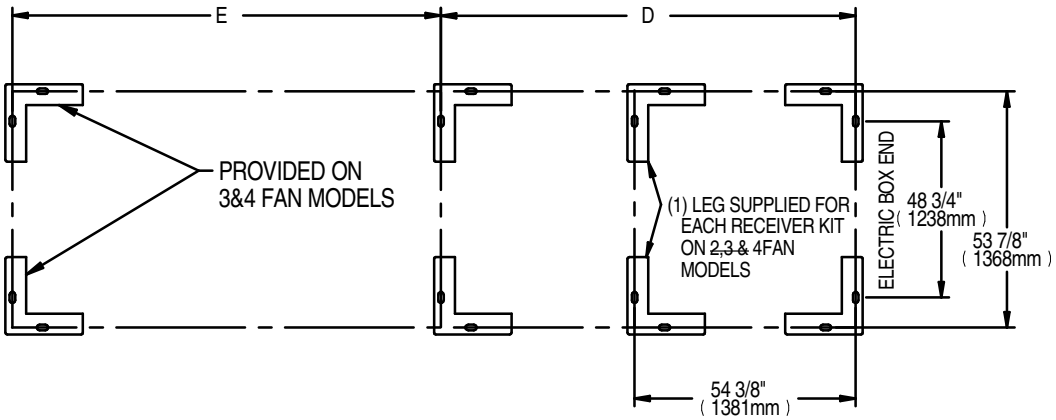
~~MCL055, MCL110, MCL165 &~~ MCL220 WITH LEE-TEMP RECEIVERS

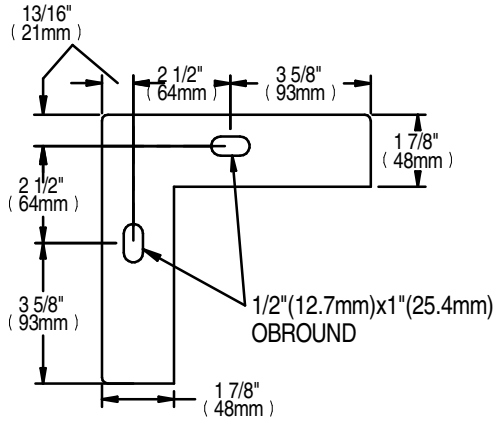



| LEG HEIGHT F* | G | H |
|---|---|---|
| IN. (MM.) | IN. (MM.) | IN. (MM.) |
| 18 (457) | 35 7/8 (911) | 43 5/8 (1108) |
| 36 (914) | ~~53 7/8 (1368)~~ | ~~61 5/8 (1565)~~ |
| 48 (1219) | 65 7/8 (1673) | 73 5/8 (1870) |
| 60 (1524) | 77 7/8 (1978) | 85 5/8 (2175) |

*CROSS BRACING REQUIRED FOR LEGS LONGER THAN 18". QUANTITY VARIES PER MODEL AND OPTIONS SELECTED.

ANCHOR PLAN



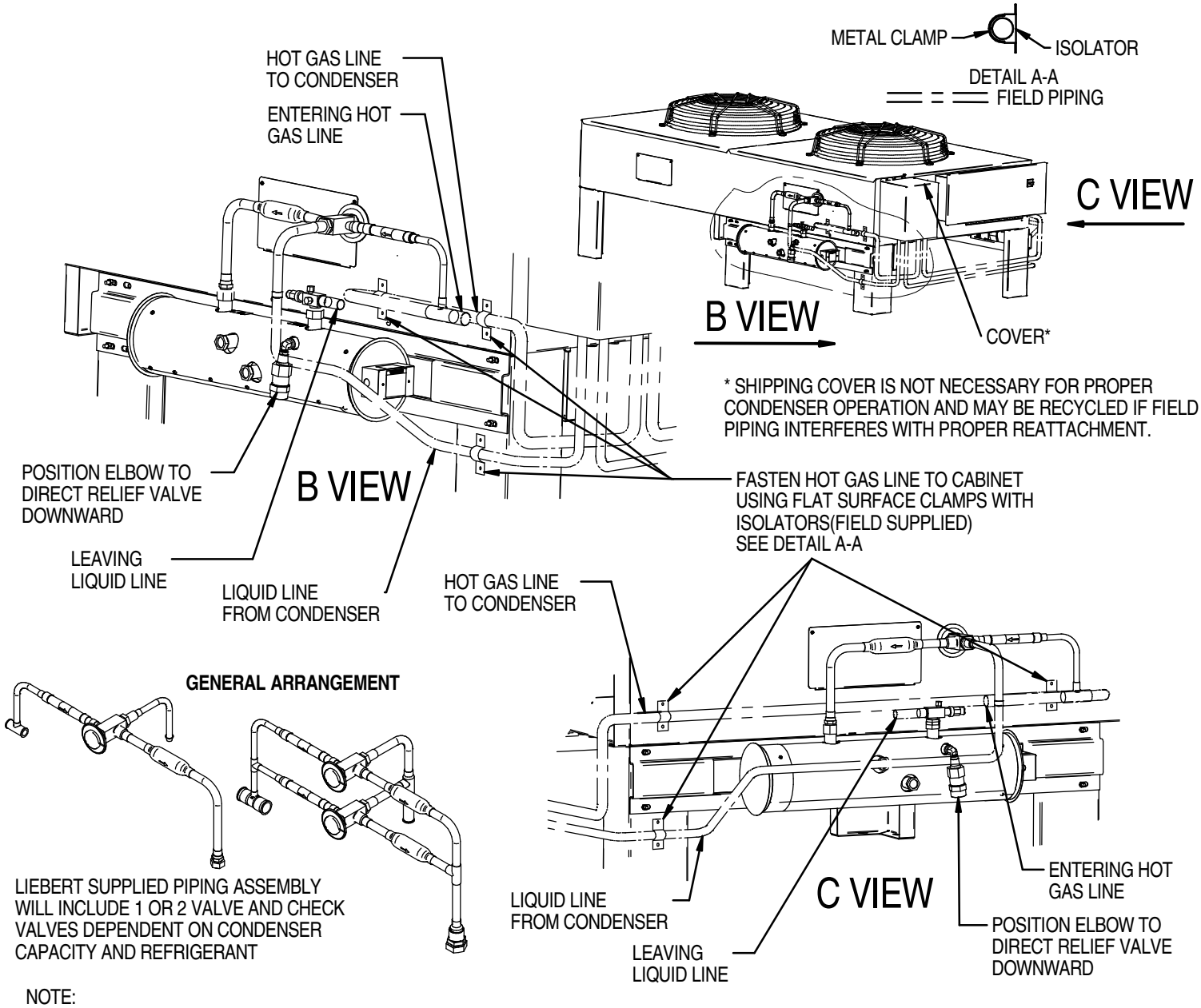

**TYPICAL FOOTPRINT**

| LIEBERT MODEL NO. | NO. FANS | A | A* (575V) | B | C | D | E |
|---|---|---|---|---|---|---|---|
| | | IN. (MM.) | IN. (MM.) | IN. (MM.) | IN. (MM.) | IN. (MM.) | IN. (MM.) |
| MCL055 | 1 | 68 (1727) | 76 1/8 (1935) | -- | 56 (1423) | 54 3/8 (1381) | -- |
| MCL110 | 2 | 124 1/8 (3152) | 132 1/4 (3360) | -- | 112 1/8 (2848) | 110 1/2 (2806) | -- |
| ~~MCL165~~ | ~~3~~ | ~~180 1/4 (4578)~~ | ~~188 3/8 (4786)~~ | ~~73 7/16 (1866)~~ | ~~168 1/4 (4274)~~ | ~~110 1/2 (2806)~~ | ~~56 1/8 (1425)~~ |
| MCL220 | 4 | 236 5/16 (6003) | 244 1/4 (6211) | 129 9/16 (3291) | 224 3/8 (5699) | 110 1/2 (2806) | 112 1/4 (2851) |

# LIEBERT MC

# PIPING: DIMENSIONAL DATA WITH LEE-TEMP

DUAL CIRCUIT CONDENSERS



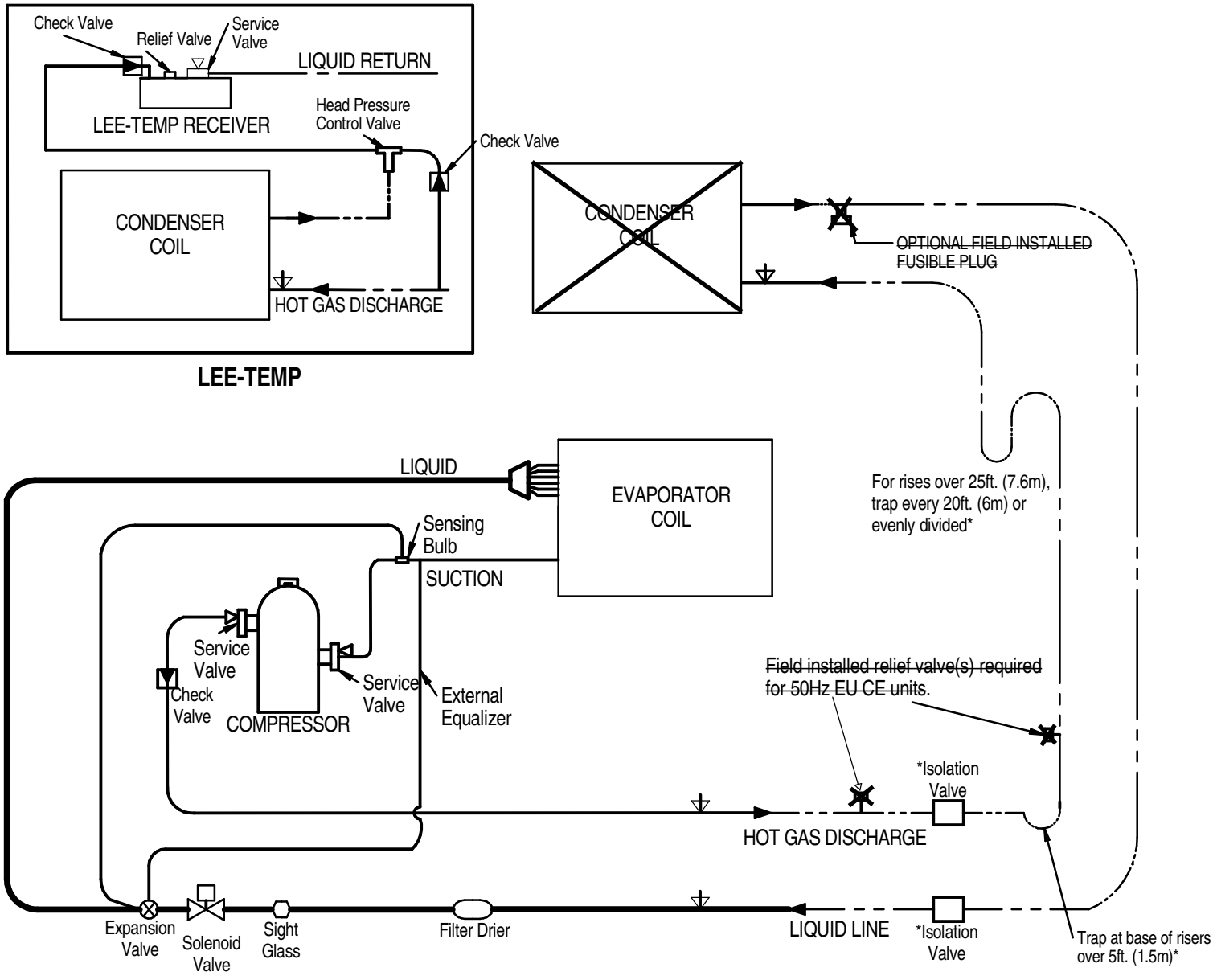

NOTE:

1. THE FOLLOWING MATERIALS ARE SUPPLIED BY LIEBERT, SHIPPED LOOSE FOR EACH CIRCUIT, AND FOR FIELD INSTALLATION:
   INSULATED LIEBERT LEE-TEMP RECEIVER TANK WITH ELECTRIC HEATER PADS AND SIGHT GLASSES, PIPING ASSEMBLY WITH HEAD PRESSURE CONTROL VALVE AND CHECK VALVE, ROTO-LOCK VALVE AND PRESSURE RELIEF VALVE.
   ALL OTHER PIPING AND ELECTRICAL WIRING TO BE SUPPLIED AND INSTALLED BY OTHERS. AN ADDITIONAL CONDENSER LEG PER CIRCUIT TO BE SHIPPED WITH THE CONDENSER.
2. FOR RUNS LONGER THAN 150FT.(45.7M)EQUIV. LENGTH, CONSULT FACTORY FOR PROPER LINE SIZING.

| CONDENSER PIPING CONNECTION SIZES | | | | | | |
|---|---|---|---|---|---|---|
| CONDENSER CONNECTIONS | | | | LEE-TEMP CONNECTIONS | | |
| MODEL NO. | CIRCUIT NO. | HOT GAS | LIQUID | HOT GAS TEE (IDS-INCHES) | LIQ TO L-T VALVE (ODS-INCHES) | RECEIVER OUT ROTO-LOCK (IDS-INCHES) |
| MCS056 | 2 | 7/8 | 5/8 | 7/8 | 5/8 | 5/8 |
| MCM080 | 2 | 7/8 | 5/8 | 7/8 | 5/8 | 5/8 |
| MCL110 | 2 | 1-1/8 | 7/8 | 1-1/8 | 7/8 | 7/8 |
| MCM160 | 2 | 1-1/8 | 7/8 | 1-1/8 | 7/8 | 1-1/8 |
| MCL220 | 2 | 1-3/8 | 1-1/8 | 1-3/8 | 1-1/8 | 1-1/8 |

# LIEBERT MC
# PIPING SCHEMATIC

CONDENSER WITH ~~AND WITHOUT~~ LIEBERT LEE-TEMP




NOTE: SINGLE REFRIGERATION CIRCUIT SHOWN FOR CLARITY.

*Components are not supplied by Liebert but are required for proper circuit operation and maintenance

——— REFRIGERANT PIPING

— — — FIELD PIPING

▽ SERVICE/SCHRADER (ACCESS) CONNECTION NO VALVE CORE

⏚ SERVICE/SCHRADER (ACCESS) CONNECTION WITH VALVE CORE

NOTE: SCHEMATIC REPRESENTATION SHOWN. DO NOT USE FOR SPECIFIC CONNECTION LOCATIONS.

# LIEBERT MC
# ELECTRICAL FIELD CONNECTIONS

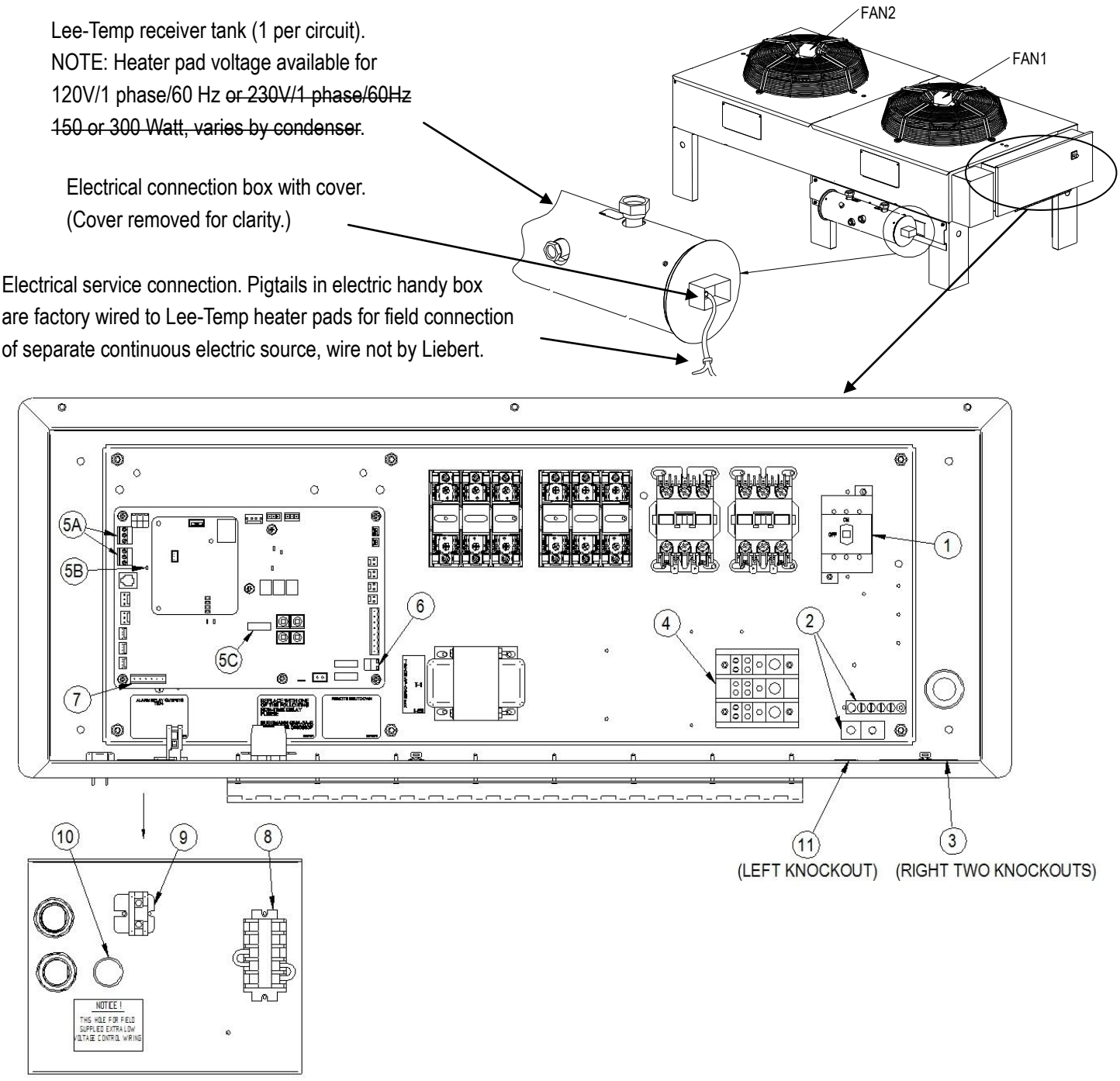
PREMIUM EFFICIENCY CONTROL WITH LEE-TEMP

**Electrical Connections for Lee-Temp Receiver**

Lee-Temp receiver tank (1 per circuit).
NOTE: Heater pad voltage available for 120V/1 phase/60 Hz ~~or 230V/1 phase/60Hz 150 or 300 Watt, varies by condenser~~.

Electrical connection box with cover. (Cover removed for clarity.)

Electrical service connection. Pigtails in electric handy box are factory wired to Lee-Temp heater pads for field connection of separate continuous electric source, wire not by Liebert.




**KEY ELECTRICAL DETAILS:**

1) **Three phase electrical service –** Terminals are on top of disconnect switch for one and two fan units. Terminals are on bottom of disconnect switch for three and four fan units. Three phase service not by Liebert. See Note 5 (below).
2) **Earth ground –** Field lug terminal for earth ground connection. Ground terminal strip for fan motor ground connection.
3) **Primary high voltage entrance –** Two 7/8" (22.2mm) diameter knockouts located at the bottom of the enclosure.
4) **SPD field connection terminals –** High voltage surge protective device (SPD) terminals. SPD is an optional device.

5) **CANbus terminal connections –** Field terminals for CANbus cable connection.
   - 5A is the CANbus connectors.
     - TB49-1 is the input terminal for CANbus high.
     - TB49-3 is the input terminal for CANbus low.
     - TB50-1 is output terminal for CANbus high.
     - TB50-3 is the output terminal for CANbus low.
     - Each CANbus cable shield is connected to terminal "SH", item 9.
   - 5B is the "END OF LINE" jumper.
   - 5C is the CANbus "DEVICE ADDRESS DIP SWITCH". CANbus cable not by Liebert. See Note 2 (below).
6) **Remote unit shutdown –** Replace exiting jumper between terminals TB38-1 and TB38-2 with field supplied normally closed switch having a minimum 75VA 24VAC rating. Use field supplied Class 1 wiring. (This is an optional feature that may be owner specified.)
7) **Alarm terminal connections –**
   **a.** Common Alarm Relay indicates when any type of alarm occurs. TB74-1 is common, TB74-2 is normally open, and TB74-3 is normally closed. 1 Amp 24VAC is the maximum load. Use Class 1 field supplied wiring.
   **b.** Shutdown Alarm Relay indicates when condenser loses power, or when a critical alarm has occurred that shuts down the condenser unit. TB74-4 is common, TB74-5 is normally open, and TB74-6 is normally closed. 1 Amp 24VAC is the maximum load. Use Class 1 field supplied wiring.
8) **Indoor unit interlock and SPD alarm terminals –**
   **a.** On any call for compressor operation, normally open contact is closed across terminals 70 & 71 for Circuit 1, and normally open contact is closed across terminals 70 & 230 for Circuit 2 from indoor room unit.
   **b.** During SPD alarm, normally open contact is closed across terminals 12 & 13. SPD is an optional device.
9) **CANbus shield terminal –** Terminal for field connection of the CANbus field supplied cables. Shield of CANbus field supplied cables must not be connected to ground.
10) **Primary low voltage entrance –** One 7/8" (22.2mm) diameter knockout that is free for customer low voltage wiring.
11) **SPD entrance –** One 7/8" (22.2mm) diameter knockout hole located at the bottom of the enclosure. High voltage surge protective device (SPD) is optional.

**NOTES:**

1. Refer to specification sheet for unit voltage rating, full load amp, and wire size amp ratings.
2. The CANbus wiring is field supplied and must be:
   a) shielded
   b) 22-18AWG stranded tinned copper,
   c) twisted pair (minimum 8 twists per foot),
   d) low capacitance (15pf/ft or less),
   e) plenum rated(NEC type CMP) if required by local codes,
   f) UV and moisture resistant or run within conduit once in an outdoor environment, and
   g) must be temperature and voltage rated for conditions present.
   h) Examples: Belden part number 89207(plenum rated) or Alpha Wire part number 6454 (UV resistant outdoor rated) category 5, 5e or higher.
3. Do not run the CANbus cable in the same conduit, raceway, or chase as high voltage.
4. For CANbus network lengths greater than 350ft(107m), contact Liebert factory.
5. All wiring must be sized and selected for insulation case per NEC and other local codes.

6. The electrically commutated (EC) motors included in the Liebert MC Condenser are suitable for connection to power supplies with a solidly grounded neutral. (Some platforms can accept power supplies listed under item b below. Contact the factory for more information.)
    a) Acceptable power supplies for 208 to 575V nominal units-
        i. 208V wye with solidly grounded neutral and 120V line to ground;
        ii. 380V wye with solidly grounded neutral and 220V line to ground;
        iii. 480V wye with solidly grounded neutral and 277V line to ground.
        iv. 575V wye with solidly grounded neutral and 332V line to ground. (uses step-down transformer)
    b) Non-acceptable power supplies for 208V to 575V nominal units –
        i. wye with high resistance (or impedance) ground;
        ii. delta without ground or with floating ground;
        iii. delta with corner ground; or
        iv. delta with grounded center tap.